REVIEW OF THE GENUS *STEPHANODES* (HYMENOPTERA: MYMARIDAE)

JOHN T. HUBER
Canadian Forest Service, Natural Resources Canada[1], email: huberjh@em.agr.ca

and

P. FIDALGO
CONICET, Instituto Fundación Miguel Lillo, M. Lillo 205, 4000, Tucumán, Argentina
email: cirpon@unt.edu.ar

Abstract

Proc. ent. Soc. Ont. 128: 27-63

The nomenclatural history of *Stephanodes* Enock is summarized. The genus is defined and compared to its probable sister genus, *Agalmopolynema* Ogloblin, and to *Polynema* Haliday, the common genus with which *Stephanodes* has been most often confused. *Masonana* Yoshimoto is treated as a new synonym of *Stephanodes*, and *Stephanodes polynemoides* (Yoshimoto) is treated as a new combination. One new species from North America, *S. septentrionalis* Huber, is described. *Stephanodes psecas* Girault is treated as a junior synonym of *S. similis* Förster, and *S. orientalis* Taguchi and *S. imbricatus* (Narayanan and Subba Rao) are treated as junior synonyms of *S. reduvioli* (Perkins). Lectotypes are designated for *S. elegans* Enock and *S. reduvioli*, and the problem of a previous lectotype designation for *S. similis* is discussed. The described species except for *S. chestertoni* (Debauche), whose type material is missing, are keyed.

Résumé

Proc. ent. Soc. Ont. 128: 27-63

Nous résumons l'histoire nomenclatrice de *Stephanodes* Enock. Nous redéfinissons le genre et le comparons avec son adelphotaxon probable, *Agalmopolynema* Fidalgo, et avec *Polynema* Haliday, le genre le plus commun avec lequel *Stephanodes* a souvent été confondu. Nous reconaissons *Masonana* Yoshimoto comme nouveau synonyme de *Stephanodes* et *S. polynemoides* (Yoshimoto) comme une combinaison nouvelle. Une nouvelle espèce d'Amérique du Nord, *S. septentrionalis* Huber, est décrite. Nous traitons *Stephanodes psecas* comme synonyme plus récent de *S. similis* Förster, et traitons *S. orientalis* Taguchi et *S. imbricatus* (Narayanan and Subba Rao) comme synonymes plus récents de *S. reduvioli* (Perkins). Nous désignons des lectotypes pour *S. elegans* Enock and *S. reduvioli* et discutons du problème engendré par la désignation antérieure d'un lectotype de *S. similis*. Nous présentons également une clé d'identification des espèces décrites, avec exeption de *S. chestertoni* (Debauche) dont les types manques.

---

[1] Correspondence address: Biological Resources Program, Eastern Cereals and Oilseed Research Centre, K.W. Neatby Building, C.E.F. Ottawa, ON Canada K1A 0C6

Introduction

The genus *Stephanodes* (Hymenoptera: Mymaridae), with only a few described species, has been collected on all continents and many oceanic islands. Its nomenclatural history is complicated because it is superficially similar to *Polynema* Haliday with which it has often been confused. Previous generic descriptions often are long and detailed and the few critical features that distinguish *Stephanodes* from other genera of Mymarini *sensu* Annecke and Doutt (1961) are hidden among many other features in common with other genera.

This project was initiated when PF was revising the Ogloblin collection in La Plata, Argentina, and found a series of 29 slide-mounted specimens from Argentina identified by Ogloblin as *Stephanodes*, some bearing manuscript names. This material was studied as well as specimens of *S. similis* from Europe and some collected by PF in northern Argentina. The first author was then asked to contribute to the study, which was expanded to a world review.

The main purpose of this paper is to clarify the taxonomy of *Stephanodes*, and provide an illustrated generic diagnosis and a new synonym. Additionally, we briefly review its taxonomic history, present descriptive notes and distributional information on the described species, and give a revised key to most of them. Two distinctly new species are discussed, one of which is formally described. A complete species level revision is not attempted because much more material needs to be collected and properly slide-mounted before this can be done meaningfully. Typically, and perhaps predictably, more nomenclatural and taxonomic problems were encountered than were initially expected. Solutions to some only are provided here. The main problems revolve around the majority of specimens which resemble, or are identical to, either *S. similis* or *S. reduvioli.*

Methods

Measurements, in micrometers, of slide-mounted specimens are tabulated (Table I). In all cases, the mean is followed in parentheses by the range and number of specimens measured. Flagellar segments were measured from the apex of the previous segment. Thus, the short section of a given funicle segment that is inserted into the apex of the previous segment (only visible in slide mounts) is not included. Abbreviations used are: F for female funicle or male flagellum, FWL, FWW, HWL, HWW, for length and width of fore- and hindwings, respectively.

Specimens for scanning electron microscopy (SEM) were prepared following Bolte (1996). Microscope slides of wings were photographed with a Lumina™ digital camera. The SEM micrograph negatives were scanned into a computer with a 35mm scanner. Both micrographs and wing images were digitized, enhanced, and the final plates compiled and labelled using Adobe Photoshop™ software.

Island group names listed in the Material Examined section follow Motteler (1986). Specimens were seen from the following institutions:

BMNH	The Natural History Museum, London. J. Noyes.
CISC	California Insect Survey, Division of Entomology, University of California, Berkeley. R. Zuparko.
CNCI	Canadian National Collection of Insects, Ottawa. J. Huber
DEFW	Department of Entomology, Fisheries, and Wildlife Collection, University of Minnesota, St. Paul. P. Clausen.
HDOA	Department of Agriculture, State of Hawaii, Honolulu. B. Kumashiro.
IARI	Division of Entomology, Indian Agriculture Research Institute, New Dehli. S. Farooqi.
IFML	Intituto Fundación Miguel Lillo, Tucumán. P. Fidalgo.
INHS	Illinois Natural History Survey, Urbana. K.C. McGiffin.

MHNG	Museum d'Histoire Naturelle, Geneva. I. Löbl.
MLPA	Museo de la Plata, La Plata. R. Ronderos.
MZLU	Museum of Zoology, Lund University, Helgonavagen. R. Danielsson.
NLHW	Naturhistorisches Museum Wien, Vienna. S. Schödl.
QDPI	Queensland Department of Primary Industries Insect Collection. B. Cantrell.
QMBA	Queensland Museum. E.C. Dahms.
TAMU	Texas A. and M. University, College Station. J. Woolley.
USNM	United States National Museum, Washington, D.C. M. Schauff.
UWEM	Department of Entomology, University of Wisconsin, Madison. S. Krauth.

Nomenclatural History

The rather complex history of *Stephanodes* is due partly to the confusion over the type species of *Polynema*, with a consequent mixup of names, and partly to Girault's (1911, 1912b, 1913) and Soyka's (1946) definition of the generic limits of *Polynema*. Though the limits of *Polynema* on a world basis are still not clear, Graham (1982) notwithstanding, those of *Stephanodes* are. Defining several of the species within *Stephanodes*, however, remains a challenge.

Shortly after Enock (1909) described *Stephanodes*, Girault (1911) synonymized it with *Polynema*. Girault (1912a, 1912b, 1913), continued to treat *Stephanodes* as a synonym of *Polynema* as did Bakkendorf (1934) and Soyka (1946), though Soyka (1956) finally treated it as distinct. Debauche (1949) incorrectly used the name *Polynema* for *Stephanodes*, having been influenced by some incorrect species synonymies proposed by Soyka (1946). Kryger (1950) used the name *Stephanodes* though he considered that there was no justification to maintain it separately from *Polynema*. Narayanan and Subba Rao (1961) treated *Stephanodes* as a subgenus of *Polynema*. Ogloblin (1946: 282) provided an important diagnostic feature for *Stephanodes*: the advanced mesothoracic spiracle, located on the suture between the pronotum and mesoscutum (Fig. 14). Since then the genus has been treated as distinct from *Polynema* by Debauche (1948), Hincks (1950), Annecke and Doutt (1961), Mathot (1968), Graham (1982), Bouček (1977), Fitton *et al.* (1978), Taguchi (1978), Subba Rao and Hayat (1983), Schauff (1984), Huber (1986), Noyes and Valentine (1989), Yoshimoto (1990), and Hayat (1992).

Biology

Known hosts of *Stephanodes* are Nabidae (Hemiptera) but one record from Cicadellidae (Homoptera) is reported here. Perkins (1905) recorded his new species *Polynema reduvioli* from eggs of *Reduviolus blackburni* (Kirkaldy) in Hawaii, and Timberlake (1924) recorded the same species from eggs of *Reduviolus capsiformis* (Germar). Thompson (1958) listed *Nabis blackburni* as the host of *Polynema reduvioli* in Australia and *N. capsiformis* in Hawaii. The predaceous *R. blackburni*, however, is apparently endemic to the Hawaiian Islands. It is generally distributed among the islands and is abundant in sugarcane fields (Swezey 1936). Thompson's citation from Australia is based on a misidentification of the host by Kirkaldy (Beardsley, pers. comm.). Kerzhner (1981) classified the cosmopolitan *R. capsiformis* as *Nabis* (*Tropiconabis*) and synonymized *N. blackburni* (Kirkaldy) with it. This synonymy is incorrect because presumably it was again based on the misidentification by Kirkaldy. Because *Nabis* is widespread (Kerzhner 1981) it is possibly also the host genus for other species of *Stephanodes* in other parts of the world. Species of only two other genera of Mymaridae, *Polynema* and *Anaphes*, are known for certain to parasitize Nabidae (Kerzhner 1981; Huber and Rajakulendran 1988).

TABLE I. Descriptive statistics for species of *Stephanodes*. Measurements in µm. Abbreviations used: FW=fore wing; HW=hind wing; L=length; W=width; ssd=sample standard deviation, postal abbreviations for provinces and states.

S. similis (Europe)
(Austria, Belgium, Czech Republic, England, Germany)

Character	n	Mean	Range	SSD
Head W	3	274	253-300	23
Gastral petiole L	9	182	158-210	17
Ovipositor L	20	287	253-316	13
Hind tibia L	20	413	355-457	23
Forewing L	11	1277	1226-1367	48
Forewing W	9	340	325-367	13
Forewing L/W	9	3.72	3.53-3.94	0.13
Scape + radicle L	5	98	93-101	3
Pedicel L	22	53	51-58	3
F1 L	21	89	79-98	5
F2 L	23	100	86-114	7
F3 L	21	75	68-81	4
F4 L	23	64	55-73	2
F5 L	22	64	55-72	1
F6 L	21	62	55-71	4
Clava L	19	141	128-144	5
Flagellum L - male	7	1359	1212-1500	138
F5 L - male	9	124	107-149	17
F5 W - male	9	28	26-32	2
F5 L/W male	9	4.47	3.35-5.83	0.9

S. similis [= *S. psecas*] (Canada - ON, QU,
United States - MO, WI, MN, IL IA)

Character	n	Mean	Range	SSD
Head W	5	233	223-239	7
Gastral petiole L	10	177	160-203	15
Ovipositor L	10	314	280-350	23
Hind tibia L	10	384	349-430	25
Forewing L	13	1202	1091-1363	338
Forewing W	12	321	285-384	32
Forewing L/W	12	3.74	3.49-4.14	0.2
Scape + radicle L	5	100	89-105	6
Pedicel L	10	53	50-58	3
F1 L	12	95	84-109	7
F2 L	12	99	86-107	8
F3 L	10	74	62-82	6
F4 L	11	62	54-78	7
F5 L	13	63	58-69	4
F6 L	13	62	56-68	4
Clava L	11	143	134-159	7
Flagellum L - male	2	1251	≈1191-1311	85
F5 L - male	2	116	109-124	11
F5 W - male	2	28	28-29	1
F5 L/W male	2	4.14	3.93-4.35	0.3

TABLE I. - continued

S. similis (Argentina)

Character	n	Mean	Range	SSD
Head W	5	225	216-235	10
Gastral petiole L	-	-	-	-
Ovipositor L	3	206	178-225	26
Hind tibia L	8	364	353-372	10
Forewing L	8	1163	1121-1210	33
Forewing W	8	294	284-304	10
Forewing L/W	8	3.95	3.88-4.04	0.1
Scape + radicle L	8	68	57-78	8
Pedicel L	8	46	39-51	4
F1 L	7	78	70-86	6
F2 L	7	99	98-101	1
F3 L	7	72	66-74	3
F4 L	7	60	59-62	2
F5 L	7	58	56-62	2
F6 L	8	58	55-59	2
Clava L	8	144	140-148	4
Flagellum L - male	2	1136	-	0
F5 L - male	2	267	265-270	3
F5 W - male	2	76	74-78	3
F5 L/W male	2	3.52	3.43-3.6	0.1

S. reduvioli (Hawaiian Islands - Kure Atoll to Molokai I.)

Character	n	Mean	Range	SSD
Head W	3	229	227-233	3
Gastral petiole L	9	162	143-182	13
Ovipositor L	11	264	235-280	12
Hind tibia L	9	362	295-397	31
Forewing L	10	1194	1088-1282	58
Forewing W	10	301	224-346	33
Forewing L/W	10	3.87	3.61-3.97	0.2
Scape + radicle L	6	93	82-97	5
Pedicel L	11	52	33-57	7
F1 L	10	82	72-88	5
F2 L	10	97	92-110	6
F3 L	11	71	60-76	4
F4 L	11	59	49-66	5
F5 L	11	60	50-66	4
F6 L	11	62	50-68	5
Clava L	10	149	143-154	3
Flagellum L - male	3	1086	999-1191	97
F5 L - male	3	202	182-226	22
F5 W - male	3	62	55-65	6
F5 L/W male	3	3.3	2.8-4.1	0.7

TABLE I. - continued

S. reduvioli (Northern Mariana Islands - Saipan) (males not available)

Character	n	Mean	Range	SSD
Head W	9	228	216-246	8
Gastral petiole L	7	154	141-174	11
Ovipositor L	13	268	256-278	7
Hind tibia L	9	348	310-360	17
Forewing L	13	1049	962-1094	40
Forewing W	14	254	227-266	11
Forewing L/W	12	4.13	3.99-4.27	0.08
Scape + radicle L	9	92	82-101	6
Pedicel L	14	52	49-56	2
F1 L	14	79	74-86	3
F2 L	15	92	72-96	6
F3 L	15	68	59-73	3
F4 L	15	59	51-65	4
F5 L	13	56	49-61	3
F6 L	14	59	52-63	3
Clava L	14	140	126-145	5

S. reduvioli [= *S. imbricatus*] (India) (males not available)

Character	n	Mean	Range	SSD
Head W	-	-	-	-
Gastral petiole L	3	158	148-167	10
Ovipositor L	3	268	255-290	19
Hind tibia L	3	354	348-367	11
Forewing L	3	1167	1108-1267	86
Forewing W	3	308	299-323	14
Forewing L/W	3	3.8	3.70-3.92	0.11
Scape + radicle L	3	99	95-104	4
Pedicel L	3	55	54-56	1
F1 L	3	83	80-88	5
F2 L	3	93	87-98	5
F3 L	3	69	66-74	4
F4 L	3	58	54-61	4
F5 L	3	62	60-63	2
F6 L	3	63	61-64	1
Clava L	3	150	147-154	3

TABLE I. - continued

S. missionicus (Ogloblin) (males unknown)

Character	n	Mean	Range	SSD
Head W	2	267	266-268	1
Gastral petiole L	2	247	237-256	13
Ovipositor L	1	323	-	-
Hind tibia L	1	528	-	-
Forewing L	3	1606	1583-1636	27
Forewing W	3	521	505-540	18
Forewing L/W	3	3.08	3.03-3.17	0.08
Scape + radicle L	1	109	-	-
Pedicel L	2	46	45-47	2
F1 L	3	100	97-103	3
F2 L	3	117	116-118	1
F3 L	3	107	101-110	5
F4 L	3	89	86-90	2
F5 L	3	89	88-90	1
F6 L	3	80	79-81	1
Clava L	3	210	196-218	12

S. septentrionalis Huber sp. n.

Character	n	Mean	Range	SSD
Head W	1	232	-	-
Gastral petiole L	2	220	200-240	28
Ovipositor L	3	314	300-325	13
Hind tibia L	2	430	364-495	93
Forewing L	3	1360	1175-1459	160
Forewing W	3	451	364-495	76
Forewing L/W	3	3.03	2.92-3.23	0.17
Scape + radicle L	2	104	103-106	1
Pedicel L	3	61	57-63	3
F1 L	3	81	71-89	9
F2 L	3	98	84-107	13
F3 L	3	81	68-89	11
F4 L	3	70	58-77	11
F5 L	3	71	60-77	10
F6 L	3	67	58-72	8
Clava L	3	152	135-163	16
Flagellum L - male	3	1344	1320-1389	39
F5 L - male	7	124	111-131	7
F5 W - male	7	27	23-31	3
F5 L/W male	7	4.57	4.0-5.39	0.51

The basis for the single cicadellid record is one female (BMNH) reared on 16.xi.1979 from *Nilaparvata lugens* (Stål) at the International Rice Research Institute, Los Baños, Philippines, by A.T. Barrion. Given the importance of this host, and the many studies on its biology, it is surprising that more records of *Stephanodes* from that pest have not been published. The host association therefore needs to be confirmed.

Taguchi (1978), cited also by Noyes and Valentine (1989), mentioned Membracidae as a host for *Stephanodes* but this was based on the incorrect inclusion of *Polynema striaticorne* in *Stephanodes*; *P. striaticorne* is reported from *Ceresa*.

Stephanodes species occur in a wide variety of habitats, including deciduous forests, bogs, marshes, and grasslands. But apart from the above host records, the biology of *Stephanodes* is unknown. Enock mentioned that live *S. elegans* had a totally different gait from *Cosmocoma* (=*Polynema*).

Taxonomy

Stephanodes Enock, 1909: 457. Type species: *Stephanodes elegans* Enock, 1909: 457, Plate XIV, figs. 6-11. By monotypy.

Eustephanodes Ogloblin, 1967: 194. Type species: *Eustephanodes missionicus* Ogloblin, 1967: 194. By original designation. Synonymized under *Stephanodes* by Yoshimoto (1990).

Masonana Yoshimoto, 1990: 63. Types species: *Masonana polynemoides* Yoshimoto, 1990: 64. By original designation. **Syn. n.**

The genus *Stephanodes* has been described or diagnosed several times in varying degrees of detail and with discussion of related genera (Debauche 1948 and 1949; Hincks 1950; Soyka 1956; Annecke and Doutt 1961; Noyes and Valentine 1989). Rather than give yet another lengthy redescription, we present here only the general habitus features and the specific diagnostic characters that distinguish it from related *Polynema*-like genera, and supplement these with Figs. 1-60. The sister genus to *Stephanodes* is likely *Agalmopolynema*, illustrated by *A. mirabile* Fidalgo (Figs. 61-92). *Agalmopolynema* was initially treated as a subgenus of *Barypolynema* (Ogloblin 1960a, 1960b); the diagnostic features of *Stephanodes* given below are compared and contrasted with it. Fidalgo (1988) gave *Agalmopolynema* generic rank; its 16 species are currently only known from the *Nothofagus* zone of South America, an area from which *Stephanodes* has not yet been reported, though a specimen of *S. reduvioli* has been collected at the edge of *Nothofagus* forest in New Zealand. In contrast, *Polynema* is a much more common and widely distributed genus than *Agalmopolynema*, with a worldwide distribution that completely overlaps that of *Stephanodes*. Though *Polynema* is not the sister genus of *Stephanodes*, it is with *Polynema* that *Stephanodes* has most often been confused. Therefore, the diagnostic features of *Stephanodes* are also contrasted with *Polynema*. This should serve to make the two genera easily separable henceforth.

The superficial similarity of the three genera is due to their colour and general profile — all the species are relatively gracile. All known species of *Stephanodes*, as well as many *Agalmopolynema*, *Polynema*, and various species of several other genera of Mymarini have the same body colour: dark brown to black with the first 3 antennal segments (scape, pedicel, F1), gastral petiole, and entire legs, except the dark brown last tarsal segment, orange to yellow.

Diagnosis. Distinguishing general features of *Stephanodes* species include the more globular head in anterior view (Figs. 3, 9) and the dorsum of the mesosoma usually more strongly and evenly curved in lateral view (Figs. 14, 20) and narrower (Fig. 13) and higher (more compressed) than in *Agalmopolynema* (Figs. 67, 68) and *Polynema*, thus clearly narrower than the head. The mesosoma and metasoma are uniformly smooth, shiny, and dark brown, with scape, pedicel, legs except apical tarsal segment, and petiole bright yellow. The forewing extends beyond the apex of the metasoma by at least 45% of its own length and thus appears relatively longer compared to the body than in *Polynema*. The wings often also appear to be disproportionately broad in some species.

Several details of the antenna, head, mesosoma, metasoma, and forewing together unequivocally define both sexes of the genus. However, any one of the features of *Stephanodes* listed below usually occurs in at least one other genus of Mymarinae, except for the nature and position of the mesothoracic spiracle (Figs. 13, 14) and the peculiar vertical slits ending in internal pits above the foramen magnum (Fig. 5), so several characters should be checked to ensure that the specimen at hand is indeed a *Stephanodes*. With practice, the genus becomes easily recognizable on general habitus features alone. Diagnostic features for *Stephanodes* (contrasting state is also given for *Agalmopolynema* and *Polynema*) are:

1. Front of head quite sharply bulging medially (as seen in lateral view), strongly depressed and receding medially above toruli and between eyes, giving the inner orbits a carinate appearance (Figs. 2, 8). Same in *Agalmopolynema* (Figs. 62, 64); flat or, at most, much less strongly bulging medially and at most slightly depressed above toruli in *Polynema*.
2. Subantennal grooves present (Figs. 3, 9). Grooves absent or scarcely indicated in *Agalmopolynema* (Fig. 63) and *Polynema*.
3. Face with 2 pits above and between toruli (Figs. 3, 9). Pits absent in *Agalmopolynema* (Fig. 63) and *Polynema*.
4. Vertex with large depressions outside each ocellus, the depressions wider and longer than an ocellus (Figs. 1, 3, 7, 9). With small depressions in *Agalmopolynema* (Figs. 61, 63); without depressions in *Polynema*.
5. Back of head with short, arched occipital carina above foramen magnum, and foramen magnum with two vertical dorsal slits extending to carina (Figs. 5, 11). Without occipital carina or vertical slits in *Agalmopolynema* (Fig. 65) and *Polynema*.
6. Antenna with inner surface of scape imbricate, with the individual imbrications not much wider than long (Figs. 44, 46, 49). With fine engraved reticulation in *Agalmopolynema* (Figs. 87, 89); at most with strongly transverse (much wider than long) striations in *Polynema*.
7. Female funicle with F1 almost always the longest, and remaining segments decreasing in length towards clava (Fig. 49); only one longitudinal sensory ridge (on F6) on the funicle. F1 shorter than F2 in *Agalmopolynema* (Fig. 90) and usually shorter than F2 in *Polynema*.
8. Prepectus fusiform, widest medially (Figs. 14, 20) and, in ventral view, relatively narrow (Figs. 15, 21). Prepectus triangular, widest dorsally (Fig. 68) and, in ventral view, relatively broad in *Agalmopolynema* (Fig. 69) and *Polynema*.
9. Marginal vein linear, with anterior and posterior margins parallel, and without proximal macrochaeta (Figs. 51, 53-60). Marginal vein linear to punctiform (Fig. 92) and with proximal macrochaeta in *Agalmopolynema*; vein swollen, punctiform, the posterior margin strongly curved and not parallel with anterior margin, and with proximal macrochaetae in *Polynema*.
10. Mesothoracic spiracle closer to anterior apex of notaulus than to tegula and virtually flush with surface (Figs. 13, 14, 19, 20). Spiracle closer to tegula and with a short stalk (perhaps only visible in scanning electron micrographs) in *Agalmopolynema* (Figs. 67, 68) and *Polynema*.
11. Propodeum smooth, without a longitudinal median carina (Figs. 18, 24). Propodeum usually without median carina in *Agalmopolynema* (Fig. 72); usually with more-or-less elongate median carina in *Polynema*.
12. Gastral petiole with a longitudinal ventral suture (Figs. 35, 38). With similar structure in *Agalmopolynema* (Fig. 81); without ventral suture in *Polynema*.
13. Metasoma with petiole apparently attached to gastral sternum, the suture between tergum 3 and sternum 3 well above petiolar insertion (Figs. 26-28, 30, 31). Structure similar in

Agalmopolynema (Figs. 73-75); petiole apparently joined to gastral tergum in *Polynema*, with the suture between tergum 3 and sternum 3 at level of petiolar insertion.

Discussion

Ogloblin (1967) proposed a new tribe, Stephanodini, for *Stephanodes* and his *Stenomymar*, as noted in his English abstract. Somehow he forgot to include his *Eustephanodes* (synonymized under *Stephanodes* by Yoshimoto 1990) in the new tribe and it is not clear from the text whether he meant to include it rather than *Stenomymar*. In any case, the tribe was to be distinguished by the position of the mesothoracic spiracle and the "subcuticular" pits on the frons, vertex and occiput. The pits on the frons are visible in some other genera, though their location is different. The pits on the vertex are actually large, shallow depressions that become deeper towards the ocelli and each ends in two pits, one on either side of each ocellus (visible in cleared slide-mounts). These pits perhaps contain glands or have a sensory function, as in some Scelionidae and Ceraphronoidea (Bin and Dessart 1983). The occiput bears two sets of pits. The relatively large pits just above the occiput may also be glandular or sensory. The very small pits just below the foramen magnum near the midline are the posterior tentorial pits, which are usually not visible in other genera. On the basis of a very similar head structure, *Stenomymar* may actually be the sister genus to *Stephanodes*, though features of the mesosoma suggest otherwise. Meanwhile, we consider *Agalmopolynema* to be the sister genus of *Stephanodes*. Previously, Ogloblin (1952) suggested that *Stephanodes*, together with *Polynema*, *Barypolynema* and *Acmopolynema*, should be placed in his new tribe Polynematini, which he distinguished from three other newly proposed tribes within the Mymarinae. Though *Stephanodes* is distinct from other genera of Mymarinae on the features listed above, such differences are not sufficient in our view to create yet another tribe, particularly when all his tribal concepts are based essentially on only the South American fauna, without reference to the Old World. Nevertheless, once the world fauna of all the "*Polynema*-group" of genera is examined in more detail, including all the new genera proposed since Ogloblin's time, his concept of tribes, modified to include genera from other regions, may prove to be one good way to classify the relatively numerous genera of Mymarinae.

Identification of the named *Stephanodes* species is difficult except for *S. polynemoides*, and perhaps also *S. septentrionalis* sp. n., described below. Annecke (1961) had similar identification problems with some apparently very widely distributed species of *Mymar*. Two species, *S. similis* and *S. reduvioli*, as we interpret them, are widespread; each apparently occurs on at least three continents, and each possibly consists of a complex of species, but if so we have not yet found reliable features to distinguish them. As mentioned above, *Nabis capsiformis*, the host of *S. reduvioli*, is widespread in the Pacific and presumably elsewhere which may account for the widespread occurrence of *S. reduvioli*. It may be that both *S. reduvioli* and *N. capsiformis* were introduced unintentionally through human activity to the various Pacific islands.

Only two keys to the species of *Stephanodes* have been published, and neither includes all of the described species. Debauche's (1948) key for Belgium treated only two species, *S. elegans* and *S. similis*. One is a synonym of the other; the characters he used to separate the two are variable. Taguchi (1978) included six nominal species in his key, also including *S. elegans* as separate from *S. similis*, and incorrectly included a species of *Polynema*. He mistakenly thought that *S. imbricatus* lacked a sensory ridge on F6 (it was not mentioned in the original description), which resulted in him describing a new species, *S. orientalis*, separated from *S. imbricatus* by the presence of a sensory ridge on F6. The other characters he used, such as relative lengths of the funicular segments in females, are variable and cannot reliably be used to separate the species.

One character not previously used to distinguish *Stephanodes* species is the number of sicklè-shaped sensilla (Bin *et al.* 1989) on F3-F6 of the female antenna (Figs. 47, 48). This varies among specimens from different areas and may be a partial solution to distinguishing at least two of the species (or species complexes), even though there appears to be slight intraspecific variation in this character. Thus, female *S. reduvioli* and *S. similis* are separated on the basis of presence or absence of a sickle-shaped sensillum on F3. Males also have one or two sickle-shaped sensilla, on each of F4-F10 at least, but too few specimens were available to determine if consistent differences occur among the species. Other features not previously used are the degree and pattern of hairiness of the face, vertex, and gena. *Stephanodes polynemoides* appears to have distinctly more setae on the vertex, but fewer on the gena, than *S. septentrionalis*, for example.

The key presented below is incomplete because we have not seen specimens of *S. chestertoni*. It is, however, an improvement over Taguchi's (1978) key, if for no other reason than it excludes species of *Polynema*. Annecke and Doutt (1961) mentioned two species from South Africa, at least one of which is apparently undescribed. Two species from Malawi, possibly the same as the South African ones, are in the CNCI. One of these is very distinct from all remaining specimens studied so it is included in the key but not described until more material becomes available (only one specimen was examined).

Key to females of *Stephanodes*
(excluding *S. chestertoni*)

1 Forewing with 3 distinct dark spots well beyond venation (Fig. 54, and Yoshimoto (1990) fig. 88) .... *polynemoides* (Yoshimoto)
\- Forewing without distinct dark spots, the disc either clear (Figs. 55-60) or at most with a slightly darker, transverse band just beyond apex of venation (Figs. 53) 2

2(1) Forewing relatively broad, L/W at most 3.3 (Figs 53, 60) 3
\- Forewing relatively narrow, L/W at least 3.5 (Figs. 55-59) 4

3(2) Forewing with a darker transverse band just beyond apex of venation (Fig. 53); funicle with F1 yellow, F2-F6 dark brown, though sometimes F2 paler .... *septentrionalis* sp. n.
\- Forewing uniformly clear beyond venation (Figs. 55-60); funicle with F1 - F5 yellow, F6 dark brown .... *missionicus* (Ogloblin)

4(2) Petiole over 0.6 times as long as gaster (148:228mμ), distinctly longer than metacoxa; mesosoma, excluding pronotum, 2.8 times as long as wide; gracile species with wings, legs and antennae unusually long; southern Africa .... undescribed sp.
\- Petiole at most about 0.4 times as long as gaster, at most only slightly longer than metacoxa; mesosoma excluding pronotum, at most 2.2 times as long as wide; more robust species with wings, legs and antennae relatively shorter; worldwide 5

5(4) F3 with 1 sickle-shaped sensillum (Fig. 48), at least on one antenna ..... *reduvioli* (Perkins)
\- F3 almost always without sickle-shaped sensilla, rarely apparently with 1 sensillum on one antenna .... *similis* (Förster)

Stephanodes similis (Förster)
(Figs. 47-52, 55, 56)

Polynema similis Förster, 1847: 218; Bakkendorf, 1934: 62; Soyka, 1946: 33; Debauche, 1948: 205.
Stephanodes similis; Debauche, 1948: 205; Hincks, 1950: 176; Mathot, 1968: 275; Viggiani, 1973: 277; Bouček, 1977: 123; Bouček and Fitton, 1978: 110; Taguchi, 1978: 75.

Stephanodes elegans Enock, 1909: 457; Soyka, 1946: 33; Debauche, 1948: 205; Hincks, 1950: 176; Mathot, 1968: 275; Bouček in Fitton *et al.*, 1978: 110; Taguchi, 1978: 75. Synonymized under *similis* by Soyka (1946).

Polynema elegans; Soyka, 1946: 33.

Polynema enockii Girault, 1911: 321; Soyka, 1946: 33; Hincks, 1950: 176; Mathot, 1968: 275. Replacement name for *P. elegans* (Enock), not Förster.

[*Stephanodes*] *enockii*; Bouček and Fitton, 1978: 110.

Polynema enocki; Debauche, 1948: 205. Misspelling.

(*Stephanodes*) *Polynema psecas*; Girault, 1911: 321 (nomen nudum); Girault, 1912a: 88 (nomen nudum).

Stephanodes psecas Girault, 1912b: 41; Debauche, 1948: 205; Taguchi, 1978: 75. **Syn. n.**

Polynema psecas; Debauche, 1948: 205.

Polynema isotoma Debauche, 1949: 7; Mathot, 1968: 275. Replacement name for *S. similis* (Förster).

Type material. *Polynema similis* ?Lectotype female (NLHW), not examined. Förster (1847) did not indicate the number of specimens he studied, where they were deposited, or which one was the "type". Part of his chalcidoid collection was sent via G. Mayr to the Vienna Natural History Museum (Horn and Kahle 1935) but some of Förster's *Stephanodes similis* specimens ended up both in Geneva and in London. Hincks (1950) stated that he had examined Förster's type, deposited in Geneva. Soyka (1956: 108) redescribed a female and a male of *Polynema similis*, both apparently without date or locality, from Vienna and stated that these specimens were a lectotype and allotype. He did not state whether he had remounted the specimens from the original minuten pins but judging from the detail in the lectotype description both specimens must have been on slides. They could not be found in Soyka's collection and neither could most of the 52 other specimens of *S. similis* listed by Soyka (1956) (Stefan Schödl, pers. comm.). Two of the 13 slide-mounted specimens loaned to us are labelled "para-type" and the remaining 10 "Typic. piece"; only 2 specimens (Hundsheim, 2.xi.1941 - see below) correspond with those listed in Soyka (1956). None, of course, is type material, but the fact that Soyka routinely labelled his specimens as some sort of type suggests that there may be a problem with his lectotype designation as well. His "allotype" designation would correctly be a paralectotype. However, until Soyka's lectotype and "allotype" are found to confirm that they really are original Förster specimens we cannot determine if his lectotype designation is valid. If it is not, then a lectotype from Förster's material in Geneva could be designated as indicated below.

Eight syntypes were examined (BMNH, MHNG). If Soyka's designations are correct (see above) there should be at least another two syntypes in NLHW. One of us (JH) reexamined the six *Stephanodes* in MHNG and concluded that they are indeed Förster's types, or at least part of his type series which included at least one female and one male, as is apparent from his original description. The two Förster specimens in London arrived with the R. von Stein collection (see below). The condition of the six Geneva specimens is as follows. Two female specimens each on its own corroded minuten pin and placed together on a cork strip on a single pin are labelled 1."*Cosmocoma similis* A. Foerst." 2."Foerster Type." 3."Type"(red label). One of the specimens lacks the gaster, some legs, and the wings, and is dirty. The second specimen appears to be complete but is so covered in dirt and webs that it cannot be examined properly. The complete specimen could be designated as the lectotype if necessary. The second pin has a minuten pin bearing one female and is labelled simply "Coll. Förster". The third pin bears two intact females and one male with the apical flagellomeres missing, each on its own minuten pin and is labelled "*Cosmocoma similis* Frst." Paralectotype labels were added to the second and third pins by JH. The two BMNH specimens are on two minuten pins on a *Polyporus* strip on a single pin. The condition of the minutens and specimens is the same as for the Geneva specimens. In addition to the original "*Cosmocoma similis* Frst." label, three other, more recently added labels read: 2."Germany (?Aachen) coll. A. Forster." 3."R. von Stein Coll. B.M. 1935-271". 4."*Stephanodes* *similis* (Forst.)." One of the specimens, probably a female, lacks both antennae, the left forewing, and right hind tarsus. The other, definitely a female, is complete. A red paralectotype label has been added to the pin by JH.

Polynema elegans. Lectotype female (BMNH), examined and here designated. Enock (1909) did not designate a holotype. The lectotype was slide-mounted by Enock and is labelled: 1. "*Stephanodes elegans* ♀ Type". 2."Woking July /85. FE." 3."Pl.XIV fig. 7". 4."enockii". A red label reading "*Stephanodes elegans* Enock Lectotype ♀ des. Huber 1997" has been added to the slide. A male slide, similarly labelled, except "fig. 6", has been labelled as one of the paralectotypes. Enock also mentioned specimens collected by Waterhouse in 1907, and Gooch in Somerset (no date) but did not indicate how many he had. There are 15 card-mounted specimens (6♀♀ and 9♂♂) from Burnham Beeches (BMNH) but only the five specimens collected in 1907 clearly form part of the syntype series and are labelled and here designated as paralectotypes. Their collection dates are 10.ix (3♂♂), 19.ix (1♂), and 30.ix (1♂). The remaining Waterhouse specimens are listed under Material Examined. The Gooch specimen(s) were not seen; at least some of them should be designated as paralectotypes when they are located.

Stephanodes psecas. Lectotype ♀ (INHS), designated by Frison (Webb 1980), examined. In fair condition, mounted laterally with head partly crushed and F5-clava of right antenna missing. On slide labelled: 1."*Stephanodes psecas* Girault 44209 Types ♀. Ill. 51485 1990" 2."Butler, 15.vii.1910 Urbana, vi.8.1910 44209 Sweeping." 3."*Polynema psecas* (Girault)". 4."LECTOTYPE *Stephanodes psecas* ♀ Girault." 5."PARATYPE *Stephanodes psecas* ♀ Girault." The "paratype" is correctly a paralectotype. The head is detached and two legs are missing but the specimen is otherwise in good condition.

Diagnosis. The absence of a sickle-shaped sensillum on F3 separates most *S. similis* from most *S. reduvioli* (sensillum present on F3), the species most closely related to it. Unfortunately, a few specimens of *S. similis* have this sensillum on one antenna and a few of *S. reduvioli* lack it, so the feature is not completely reliable. No completely reliable feature was found that separates all specimens of *S. similis* from all of *S. reduvioli*. Specimens that have a sickle-shaped sensillum on only one antenna are therefore placed in one or other species on the basis of provenance and specimens collected at the same locality that clearly fall in one species or the other as defined here.

Descriptive notes. Measurements of the antennal segments for both sexes and forewings are given in Table I. Debauche's (1948) detailed redescription of *S. similis* includes many features common to most *Stephanodes*. One mistake, perpetuated in Taguchi's (1978) key to species, was that Debauche did not notice that F6 of the antenna bears 1 sensory ridge, as do all species of *Stephanodes*. The sensillum is difficult to see and often is not visible depending on the antennal position in slide mounts.

Variation. Colour varies slightly. A specimen from Spain has the petiole, legs, and scape, pedicel and F1 light brown instead of yellow.

Differences in the mean length of the male flagellum occur among the populations from eastern North America, Europe, and Argentina (Table I). The funicle segments in males of *S. psecas* average slightly longer than in *S. similis*, as pointed out by Girault (1911), but there is overlap between the two populations. We prefer to treat the various populations as representing a single species in this case, particularly because the sample size for each population is too small to make reliable inferences, and there is considerable overlap in individual measurements.

Occasionally a sickle-shaped seta is found on F3 of one antenna (one of 13 slide-mounted eastern North American females, three of 24 of European females) and 2 specimens apparently had the seta on F3 of both antenna (two Austrian specimens in NLHW).

Girault (1911, 1912a, 1913) mentioned several features to separate *S. similis* from *S. psecas* but none of them appears to be valid. He also contradicted his own observations, as noted below.

1. Girault (1911, 1912a) stated that *S. psecas* has F1 less than F2 and F5 shortest of the last three segments whereas *S. similis* has F1 greater than F2 and F5 longest of the last three segments. Half of the female *S. psecas* we measured (6 of 12) have F1 longer than F2, and the other half have F1 shorter than F2. In *S. similis* all 24 specimens had F2 longer than F1. In female *S. psecas* none of 12 specimens has F5 the shortest of the apical three funicle segments. Instead, they have different combinations such as two segments equal in length, others with F4 as the longest, and yet others with F5 or F6 the longest. In female *S. similis*, 6 of 23 specimens have F5 the longest, 13 have F4 the longest, and 4 have F6 the longest.

2. In male *S. psecas* mean flagellar length is less than for *S. similis* (Table I), the opposite of what Girault (1913) stated.

3. The mean length/width ratio of the forewing (Table I) is slightly less in *S. similis* than in *S. psecas*, the opposite of Girault's (1911) observation.

Our observations of the nominal species thus indicated greater variability than Girault was aware of and considerable overlap among the North American and European populations. We consider the two species conspecific, as Girault (1912b) had suspected.

Distribution. Europe, North America (Canada, eastern and northern states), Argentina. The wide distribution of *S. similis* may be due to its apparent association with widespread host(s) on widely distributed grasses such as *Cynodon dactylon.* The presence of *S. similis* in Argentina is considered to be due to human introduction from the northern hemisphere. Similar broad distributions occur in some species of other mymarid genera e.g., *Mymar* spp. (Annecke 1961), *Polynema saga* (Girault) (Ogloblin 1960b). The species has been collected in deciduous and spruce forests in Europe, confirming Debauche's (1948) observations, though most labels did not give a habitat. *Stephanodes similis* must have several generations per year as it has been collected in the northern hemisphere during all months except January and in Argentina in all months except September. Based on material examined to date, the distributions of *S. similis* and *S. reduvioli* appear to be mutually exclusive. In the western hemisphere *S. similis* has not yet been found on the west coast of either North or South America, whereas *S. reduvioli* has not been found in Europe, or the Americas except for the west coast.

Hosts. Unknown.

Material examined. All specimens are on slides unless otherwise stated; the presence or absence of sickle-shaped sensilla on female F3 could not be verified on pointed specimens so their inclusion in *S. similis* is by geographical association only.

ARGENTINA (all specimens in MLPA unless otherwise stated). **Buenos Aires:** Bella Vista, 25.iii.1959, A. Ogloblin (1♀); José C. Paz, 14.i.1939, A. Ogloblin (3♀♀), 1940 (1♀), vi.1940 (1♀), 20.xii.1940 (1♀), no date (1♂, 2♀♀) *Cynodon dactylon*, 2.x.1942 (1♀); La Plata, iv.1932, J.A. Rosas Costa (1♀); Tigre, Puerto Tirol, 9.iv.1947, A. Ogloblin (1♂). **La Rioja**: Gobernador Gordillo, 2.v.1955, A. Ogloblin (1♀). **Misiones:** Loreto, 14.ii.1932, A. Ogloblin (1♀), 19.ii.1932, A. Ogloblin (1♀), 23.ii.1932 (1♀), 12.iii.1934, A. Ogloblin (1♀), 20.vi.1936, A. Ogloblin, *Cynodon dactylon* (1♀); 12.vii.1936, A. Ogloblin, *Cynodon dactylon* (1♀), 25.vii.1936, A. Ogloblin, *Cynodon dactylon* (1♀), 14.xi.1936 (1♀), 15.xi.1936, A. Ogloblin (1♀); **Salta (Dept. Oran):** Rio Pescado 17.v.1955 (1♀); **Santa Fe:** Capital, 20.viii.1951, A. Ogloblin (1♀); Santiago del Estero: Termas de Rio Hondo, 24.iv.1951, A. Ogloblin (1♀, 1♂); **Tucumán:** Tafí del Valle, iv.1985, M.A. Delfino (1♀, IFML).

AUSTRIA. **Lower Austria:** Hundsheim, 12.xi.1954 (6♀♀), 22.xi (3♀♀) and 10.x., am fenster (1♀), and 2.x.1941, W. Soyka (NHMW); Hundsheim, Spitzerberg südseite, 2.xi.1941, Novicky (2♀♀, NHMW), Hundsheim, am fenster aus Heu, vii and 22.vii.1943, W. Soyka (1♀, 1♂, USNM). **Styria:** Paal, 11.vii.1958, *Picea excelsa* [= *abies*], ex. ?*Camptomyia strobi* (1♀ on point, MHNG).

BELGIUM. **Brabant:** Ottignies, 11-18.ix.1982, P. Dessart (1♂ on point, CNCI).

CANADA. **Alberta:** Beauvais Lake Provincial Park, 15.vii.1980 G. Gibson (1♀ on point); George Lake, 53°57'N 114°06'W, 2.vi and 19-28.vi.1980, G. Gibson (2♀♀ on points). **Quebec:** James

Bay hwy. km 256-366, vi.1985, H. Goulet (1♀ on point). **Yukon Territory:** Ross River, 16.vi.-31.viii.1984, S.&J. Peck, aspen-willow river terrace (1♀ on point).

CZECH REPUBLIC. **Bohemia:** Revnice near Prague, viii.1925, A. Ogloblin (1♀, 1♂, MLPA). **Moravia:** Vranov, River Dyje, 13.viii.1991, L. Masner (2♀♀, 1♂ on points, CNCI).

FRANCE. **Côte d'Or:** Esbarres, 16.ix.1957, J. Barbier (1♂ on point, CNCI). **Haute Savoie:** Rumilly, 14.ix.1960, C. Besuchet (1♀ on point, MHNG). **Hérault:** Montpellier, 12-16.ix.1978, J.T. Huber (1♀ on point, CNCI).

GERMANY. **Bavaria:** Erlangen, Kifenwald, no date, Dr. Stammer (1♀, NHMW). **Berlin:** Berlin, Botanical Garden, no date or collector (3♀♀, 2♂♂, USNM).

HUNGARY. Mernye Szama, 17.viii-4.ix.1985, N.D. Springate (1♀ on point, CNCI).

ITALY. **Calabria:** CS, La Sila Larica, 1300m, 23.vi.1988, J.D. Pinto (1♂ on point, CNCI).

POLAND. Sliemiewice, 1941, S. Novicky (1♂, Soyka collection).

RUSSIA [?UKRAINE]. Byekovo [?Berehovo], Podkarp., viii.1925, A. Ogloblin (1♂, MLPA).

SPAIN. **Navarra:** around Alsasua, no date, H. Franz (2♀♀ on points, CNCI). **Segovia**: Puerto Navacerrada, 1400m, 13.iv.1960, C. Besuchet, mousses (1♀ on point, MHNG).

SWEDEN. **Uppland:** Uppasla, Eriksberg, 11-19.vii.1987, F. Ronquist (1♀ on point, CNCI).

SWITZERLAND. **Fribourg:** 4.5 km E. Heitenried, 650m, 16.v.1992, H. Baur (1♀ on point, CNCI). **Genève**: l'Allondon, 7.v.1959, C. Besuchet, tamissage de mousses (1♀, MHNG); Les Tuileries near Chambesy, 21.ii.1962, C. Besuchet, vieille souche (1♀ on point, MHGH); Mategnin, 22.iii.1960, A. Comellini (1♀ on point, MHNG). **Vaud:** Commugny, 24.vi.1956, vitre d'étable, J. Steffen (2♀♀ & 1♂ on points, MHNG); Veytaux, 24.x.1966, bois pourri, C. Besuchet, (1♀, MHNG). **Schaffhausen**: Merishausen, 17.x.1967, feuilles mortes, C. Besuchet (2♀♀, MHNG). **Solothurn:** Richenbach, 560m, 25.viii & 1.ix.1994, P. Flückiger (2♀♀ on points, CNCI). **Valais**: Vouvry, 16.vii.1966, lavage de terre, C. Besuchet, (1♀, MHNG). **Vaud:** Commungny, 24.vi.1956, J. Steffen (1♂ on point, CNCI). **Zurich:** Dielsdorf, 650m, 17.viii.1984 (8♀♀ and 14♂♂ on points, CNCI).

TURKEY. Adana, no date, under *Citrus,* leg. Soylu (11♀♀ & 1♂ on points, MHNG).

UK. England. **Buckhinghamshire:** Burnham Beeches, 1.vi.1908, 24.vi.1908, 23.vii.1908, 13.vii.1910, 26.v.1911, 8.vi.1911, and 24.viii.1911, C. Waterhouse (6♀♀, 4♂♂, BMNH), 2.vi.1908 and 23.vii.1909 (1♀, 1♂, USNM). **Essex:** Epping Forest, Loughton, 18.ix.1908, C. Waterhouse (1♂, BMNH). **Cambridgeshire:** Abbots Ripton, Monks Wood NNR, 17-28.vii.1978, Fitton & Noyes (1♀, BMNH). Scotland. **Strathclyde:** Argyll, Rannoch Moor, 12.vii.1977, Noyes, Rogers & Huddleston (1♀, 2♀♀, BMNH). Wales. **Gwynedd:** Llandudno, 3.viii.1910, 8.viii.1910, C.O. Waterhouse (1♀, 3♀♀, BMNH).

USA. No locality or date (2♀♀ det. as *S. psecas* by Girault, USNM). **Illinois:** Urbana, 25.ii.1945, J.L.C. Rapp (2♀♀, USNM), 22.iv.1909, J.D. Hood (1♀, USNM); Mattoon, 16.viii.1910 A.A. Girault (1♀ and 1♂, USNM). **Iowa:** Ames, 10.x.1943 (1♀, 1♂, USNM, MLPA) 15.x.1943, A. Ogloblin (1♀, MLPA); 17.x.1943, (8♀♀, MLPA); 26.x.1943, Ogloblin (1♀, 2♂♂, MLPA); 3.xi.1943 (1♀ compared with type, MLPA). **Minnesota:** Crookston, 12.ix.1960, A.E. Grable (3♀♀, DEFW); Lansboro, 15.ix.1913 (2♀♀, DEFW). **Missouri:** Williamsville, 12-29.v.1970, J.T. Becker (1♀ on point). **Wisconsin:** Rock Co., T4N,R13E,S25, 1-17.vi.1976 (1♀, UWEM).

YUGOSLAVIA. **Slovenia:** Bled, 5-12.viii.1978, L. Huggert (1♂ on point, CNCI), Rakek, 6.viii.1978, L. Huggert (1♀ and 1♂ on points, CNCI).

Stephanodes reduvioli Perkins
(Figs. 57-59)

Polynema reduvioli Perkins, 1905: 196. References subsequent to the original description are given in Beardsley and Huber (in press).

Polynema (*Stephanodes*) *imbricatus* Narayanan & Subba Rao, 1961: 667. **Syn. n.**

Stephanodes imbricatus; Taguchi, 1978: 75; Subba Rao and Hayat, 1983: 140; Hayat, 1992: 87.
Stephanodes orientalis Taguchi, 1978: 73; Subba Rao and Hayat, 1983: 140. **Syn. n.**
S. similis; Doutt, 1955: 17, misidentification.

Type material. *Stephanodes reduvioli.* Lectotype female (BMNH), examined and here designated, in good condition. Labelled: 1."*Polynema reduvioli.* P. 3♀ 1♂ Hawaiian Is.". 2."R.C.L. Perkins Coll. B.M. 1955-742". Paralectotypes. 2 females and 1 male, on same slide as lectotype. A red label reading: "*Polynema reduvioli* Perkins Lectotype ♀, des. Huber 1997" has been added to the slide. The lectotype is the lower right specimen on the slide.

Perkins did not designate a holotype and did not indicate how many specimens he had examined, though there must have been at least a male and a female. The lectotype slide bears no date. Because it is the only Perkins material of *P. reduvioli* that is slide mounted it is the most appropriate to designate as lectotype because the sickle-shaped sensilla are clearly visible. Additional, potential type material consists of one male and one female specimen (BPBM) from Makaweli P., xi.1905 and 7.xi.1905 (no collector mentioned), though the date may indicate the specimens were collected a little too late to be described and published by Perkins in November, 1905. Finally, the BMNH has four card-mounted specimens on 3 pins that are Perkins material. The date on one specimen is "1906" so we are assuming that none of these specimens is part of the original material.

Stephanodes imbricatus. Holotype female (IARI), not examined. The exact number of paratypes was not mentioned in the original description, but all were collected in 1960.

Stephanodes orientalis. Holotype female (Ehime University, Matsuyama), not examined.

Diagnosis. The presence of a sickle-shaped sensillum on F3 separates most female *S. reduvioli* from *S. similis*. As for *S. similis*, a few specimens of *S. reduvioli* were found to have this sensillum on one antenna only, so the feature is not completely reliable. Specimens with a sensillum on only one antenna may be *S. similis* instead. As for *S. similis*, provenance of the specimens will help determine the species to which they should be assigned.

Descriptive notes. Forewings of the nominal species *S. reduvioli* (from Kaui I., Kokee), *S. orientalis* (from Tsukuba), and *S. imbricatus* (from New Dehli) are illustrated in Figs. 57-59, respectively, and measurements of two populations are given in Table I. Little variation could be found but measurements of specimens from different islands sometimes do not overlap for certain characters, *e.g.*, forewing L/W of specimens from Saipan compared to specimens from the Hawaiian Islands (Table I).

Discussion. Hayat (1992) thought it likely that *S. imbricatus* would be eventually synonymized under *S. similis* but we synonymize this species under *S. reduvioli* instead because of the presence of a sickle-shaped sensillum on F3 on the three topotypical specimens examined.

Distribution. *Stephanodes reduvioli* is widespread in the Oriental, Australian, parts of the Palaearctic regions, and many Pacific islands. Of particular interest are the records from California and Peru, the only ones for the western Hemisphere. Beardsley and Huber (in press) listed collection localities throughout the Hawaiian island chain from Hawaii I. to Kure Atoll. Other records are given below. Its distribution appears to be mutually exclusive to that of *S. similis.*

Material examined. AUSTRALIA. **New South Wales**: Monga State Forest, 700m, 19-24.i.1984, L. Masner (1♂ on point, CNCI); Clyde Mountain, 1000m, 21.i.1984, L. Masner, lush ferns in Eucalyptus forest (4♀♀ and 1♂, on slides, 29♀♀ and 1♂ on points, 7♀♀ used for SEM, CNCI). **Northern Territory**: 58 km SE. Adelaide River, 28.iii.1991, J.D. Pinto (1♀, CNCI). **Queensland:** 41 km N. Charleville, Warrego River, 16.v.1991, E.C. Dahms, G. Sarnes (1♀, QMBA); Yeerongpilly, 1-10.i.1982, B. Cantrell (4♀♀, QDPI). **South Australia:** Fleurieu Peninsula, Deep Creek Conservation Park, 25.xi.1989 & 10-24.xii.1989, R. Wharton (3♀♀ on points, TAMU). **Victoria**: The Grampians, Rose's Gap, 17-21.xii.1989, R. Wharton (1♂, TAMU). **West Australia:** 10 km N. Kununurra, 25-

29.iii.1991, G. Gordh & J.D. Pinto (1♀ on point, CNCI); The Grotto, 25 km S. Wyndham, 26.iii.1991, J.D. Pinto (1♀ on point, CNCI).

ECUADOR: **Galapagos Is.**: Santa Cruz I., Bellavista, agriculture zone, 160m, 1-9.iv.1989, S. Peck & B. Sinclair (1♀, CNCI).

FIJI. **Viti Levu:** Nandarivatu, 1100m, microwave station, 16-23.viii.1978, S. & J. Peck (1♀ on point, CNCI).

FRENCH POLYNESIA. **Bora Bora:** 1 km E. Faanvi, 5.ix.1984, D.M. LaSalle (1♀ & 1♂ on points, CNCI). **Moorea**: Haapiti, marker 16 on highway, 1.ix.1984, D.M. LaSalle (1♂, CNCI); Roto Nui, 31.viii.1984, D.M. LaSalle (3♀♀ & 2♂♂, CNCI). **Tahiti:** Maeva Beach, 8.ix.1984, D.M. LaSalle (2♀♀ & 1♂ on points, CNCI).

INDIA. **Delhi Territory**: Delhi, 11.v.1957 (1♀, IARI) and iii.1962, B. Subba Rao, on lucerne (2♀♀, CISC).

IRAN. **Central Province**: Karaj, 16-22.vii.1978, J.T. Huber (1♀, CNCI); Shahdasht, 5.vi.1978, J.T. Huber (1♀, CNCI).

JAPAN. Honshu. **Ibaraki Prefecture**: Tsukuba, NAIES, 31.v-8.vii and 26.vi-10.vii.1989, M.J. Sharkey (1♂, CNCI).

NEW ZEALAND. **BP**: Mamaku Plateau, Galaxy road, 27 km W. Rotorua, 6-11.iii.1978, S.& J. Peck (1♀, BMNH). **OL:** Makarora, 21-24.i.1978, S. & J. Peck (1♀ on point, CNCI).

NORTHERN HAWAIIAN ISLANDS. **Kure Atoll**: ix.1961, G.D. Butler (6♀♀, CISC).

NORTHERN MARIANA ISLANDS. **Saipan**: no locality and Chalan Kanoa, 11.xi.1948, R.L. Doutt, sweeping grass (19♀♀, CISC).

PERU: **Lima**: Chosica, 16.xii.1983, A. Finnamore (1♀, CNCI).

USA: **California**: Shasta Co., Castello, 26.vi.1954, R.O. Shuster & B.J. Adelson (1♀, CISC).

Stephanodes polynemoides (Yoshimoto)
(Figs. 7-12, 19-24, 29-32, 36-38, 54)

Masonana polynemoides Yoshimoto 1990: 100.

Type material. Holotype (CNCI), examined. Point-mounted, in good condition except right hindwing missing, and left antenna and forewing mounted in Canada balsam on slide. The type label gives the altitude of the type locality as 1700m (not recorded in the original description).

Diagnosis. The forewing (Fig. 54) has two very dark apical spots and a single broad band beyond the venation. These features easily characterize this species. The size of the apical spots varies considerably. Two specimens from Guatemala have very small spots, whereas most other specimens have larger spots and, in particular, the anterior spot may vary from being almost circular to kidney-shaped. We consider all these variants to represent intraspecific variation.

Distribution. The species extends from Ecuador to Central Mexico and has been collected mainly above 1500m, though one specimen was collected at 700m.

Material examined. The following records are in addition to the type material listed by Yoshimoto (1990).

COSTA RICA. **Alajuela:** Penas Blancas, 700m, 18.viii.1986, L. Masner, rainforest (1♂, CNCI). **San José:** Zurquí de Moravia, 1600m, v.1995, P. Hanson (1♂, CNCI).

GUATEMALA. **Zacapa:** above San Lorenzo, 2200m, xi.1986, M. Sharkey (1♀, CNCI). **Sacatepequez:** Volcán Agua, 1700, above Antigua Guatemala, 23.xi.1986, M. Sharkey (1♀, CNCI).

Stephanodes missionicus (Ogloblin)
(Fig. 60)

Eustephanodes missionicus Ogloblin, 1967: 194.
Stephanodes missionicus; Yoshimoto, 1990: 72.

Type material. Holotype ♀ (MLPA), examined. This species was described from two females from Aristóbulo del Valle, Missiones, collected on 28.xi.1960 and 15.xi.1962. Three specimens (on three slides) in the MLPA collection belong to this species but only one slide bears one of these dates (28.xi.1960). The specimen on this slide is treated here as the holotype and is labelled accordingly. The second specimen is either missing, or else Ogloblin simply misrecorded the date and it is on one of the two other slides in MPLA. These have the following data: Aristóbulo del Valle, xi.1963 and Dos de Mayo, 12.xii.1965. The first slide bears only wings and antennae but the second has a complete specimen.

Diagnosis. *Stephanodes missionicus* is most similar to *S. septentrionalis*, from which it is distinguished by its mostly yellow female funicle, and its very slender body and relatively long appendages. Measurements are given in Table I.

Distribution. Argentina.

Stephanodes chestertoni (Debauche)

Polynema chestertoni Debauche, 1949: 67.
Stephanodes chestertoni; Mathot, 1968: 275; Taguchi, 1978: 75.

Type material. Holotype ♀, not examined. This species is not included in the key because we were unable to examine the types, the only material of this species known, and the original description provides no reliable indication on how to differentiate the species from other *Stephanodes* species. Apparently the types were never returned to the Musée Royal de l'Afrique Central, Tervuren (E. Deconinck, pers. comm.).

Stephanodes septentrionalis Huber sp. n.
(Figs. 1-6, 13-18, 25-28, 33-35, 39-42, 43-46, 53, Table I)

Diagnosis. Forewing (Fig. 53) relatively larger (wider and longer) than *S. similis* or *S. reduvioli* and with a faint but distinct dark band formed apparently by darkened setae a little beyond apex of venation (without band or rarely with faint suffusion in the other species except *S. polynemoides*). The petiole is about the same length in *S. septentrionalis* and *S. missionicus*, but relatively longer than in the other clear-winged species. Thus, on wing and petiole measurements, *S. septentrionalis* appears to be most similar to *S. missionicus*, but the latter lacks the darker band on the forewing and has a longer marginal space (area devoid of microtrichia on dorsal wing surface just beyond venation) than *S. septentrionalis*. The new species occurs sympatrically with *S. similis*, *e.g.*, both species were collected at the same time and place at George Lake, Alberta.

Type Material. HOLOTYPE ♀ (CNCI), on slide under 4 coverslips and labelled 1."ON: Aylmer, 8.ix.1978, L. Masner, G. Gibson, H. Goulet, primary forest, sweeping." 2."Stephanodes septentrionalis Huber HOLOTYPE ♀ dorsal". The type locality is actually the Springwater Conservation Area, 6 mi. W. Alymer (H. Goulet and L. Masner, pers. comm.), as for some of the paratypes.

PARATYPES (CNCI, USNM, BMNH, UCRC). 25♀♀ and 14♂♂ on points or cards, 3♀♀ and 10♂♂ on slides. The bodies of 4 specimens were used for SEM, and their wings are on a slide. The specimens were collected by screen sweeping, Malaise traps and pan traps. CANADA. **Alberta:** 20

mi. W. Legal, George Lake, 31.v-3.vi.1978, D.R. Smith (1♀, USNM); 0.5 km E. Writing-on-Stone Provincial Park, 15-22.vi.1981, D. McCorquodale (1♂). **British Columbia:** Blind Bay, Shuswap Lake, 1-15 and 15-31.viii.1986, C.A. Elsey (18♂♂); Sorrento, 17-20.vii.1991, H. Goulet, weedy garden (1♀, 3♂♂, wings only, rest of body for SEM). **New Brunswick:** Fundy National Park, Wolfe Point campground, 27.viii.1984, M. Kaulbars (2♀♀); Kouchibouguac National Park, 31.v.1977, S.J. Miller (1♀). **Nova Scotia:** Cape Breton Highlands National Park, 46°85'N 60°26'W, 22.vi.1983, barrens (1♀). **Ontario:** Aylmer, 8.ix.1978, L. Masner, G. Gibson, H. Goulet, primary forest (6♀♀); Innisville, 25.vii.1963 (1♂); Milton, 8.ix.1981, M. Sanborne (3♀♀); Lake Louisa, Algonquin Park, 17.v.1980, S. & S. Miller, sweeping hardwoods (1♀); Springwater Conservation Area, 6 mi. W. Aylmer, 28.v-4.vi.1979, L. Masner, (1♀); St. Lawrence Is. National Park, Grenadier I. central, 16.vii.1975, ex. *Quercus rubra*, E. Sigler (1♀); Wylde Lake bog, 8 km E. Arthur, 15-23.v 1987, S.A. Marshall, lake edge and floating mat (2♀♀) and 8-15.vi.1987, floating mat, D. Blades (1♀). **Quebec:** James Bay highway, km 129, 10-18.vi.1985, H. Goulet & D.R. Smith (2♀♀, USNM) and km 256-366, vi.1985, H. Goulet (1♀).

USA. **New Hampshire:** 5.6 km S. Gorham, hwy. 16, 9.ix.1987, A. Smetana (2♀♀). **Pennsylvania:** Cambia Co.: 3 km N. Wilmore, 650m, 30.v.1991, L. Masner (1♀). **Washington:** Ashford, W. Mt. Rainier National Park, 1-14.viii.1985, L. Masner (1♀). **Wisconsin:** Bayfield Co.: T46N R9W,S16, 31.viii-8.ix.1976 (1♂, UWEM).

Distribution. Canada, Northern United States.

Biology. Host unknown. The species was collected in various, mostly natural, habitats including a primary forest (Aylmer, ON), a weedy residential garden (Sorrento, BC), a bog (Wylde Lake, ON), and rocky barrens (Cape Breton Highlands Nat. Park, NS). It is mainly a northern species, to date found only as far south as Pennsylvania.

Species name. Latin for north, referring to its more northerly distribution relative to the other western hemisphere species of *Stephanodes*.

Species check list, geographical distribution and abundance.

Stephanodes is a worldwide genus, occurring on all five continents and many oceanic islands. Ten nominal species have been described to date. Previous synonymy reduced this to seven and we further reduce this to five. In the list below, synonyms and replacement names are indented under the next most senior synonym, and the original generic placement is given in parentheses. The region from which each nominal species was first described is also given.

- *S. similis* (Förster) (*Polynema*). Germany.
  - *S. isotoma* Debauche (*Polynema*), replacement name.
  - *S. elegans* Enock. England.
  - *S. enockii* (Girault) (*Polynema*), replacement name.
  - *S. psecas* Girault. USA. **Syn. n.**
- *S. missionicus* Ogloblin (*Eustephanodes*). Argentina.
- *S. chesteroni* (Debauche) (*Polynema*). Zaire.
- *S. reduvioli* (Perkins) (*Polynema*). Hawai'i.
  - *S. imbricatus* Narayanan & Subba Rao (*Polynema*). India. **Syn. n.**
    - *S. ahlaensis* Mani & Saraswat (1973) (*Polynema*). India.
  - *S. orientalis* Taguchi. Japan, Taiwan. **Syn. n.**
- *S. polynemoides* (Yoshimoto) (*Masonana*). Costa Rica, Ecuador, Venezuela, Panama. **Comb. n.**

Territories (and islands within territories) from which material has been examined but not necessarily identified to species are listed below. The specimens are in the CNCI unless otherwise noted. Undoubtedly more countries could be added from specimens in collections not yet examined. Such specimens may be misidentified as *Polynema*. Taiwan, which has a *Stephanodes* recorded from it in the literature, but for which voucher specimens were not seen by us, is included followed by the literature reference.

Nearctic: Canada, United States.

Neotropical: Argentina, Bolivia, Chile (UCD), Costa Rica, Dominica (USNM), Ecuador (Galapagos Is.), Guatemala, Mexico, Netherlands Antilles, Panama, Peru, Venezuela.

Palaearctic: Belgium, Czech Republic, France, Germany (BMNH), Italy, Hungary, Japan (Honshu, Kyushu, Shikoku) Spain, Sweden (MZLU), Switzerland, UK (BMNM), Yugoslavia, Iran, Nepal.

Afrotropical: Botswana, Ethiopia, Ivory Coast, Malawi, Mauritius (BMNH), Nigeria, Sierra Leone (MZLU), South Africa (BMNH, MZLU), Sudan (BMNH), Zaire, Zambia.

Oriental: India (CISC, IARI), Pakistan, Philippines (Luzon I.) (BMNH), Taiwan (Taguchi 1978).

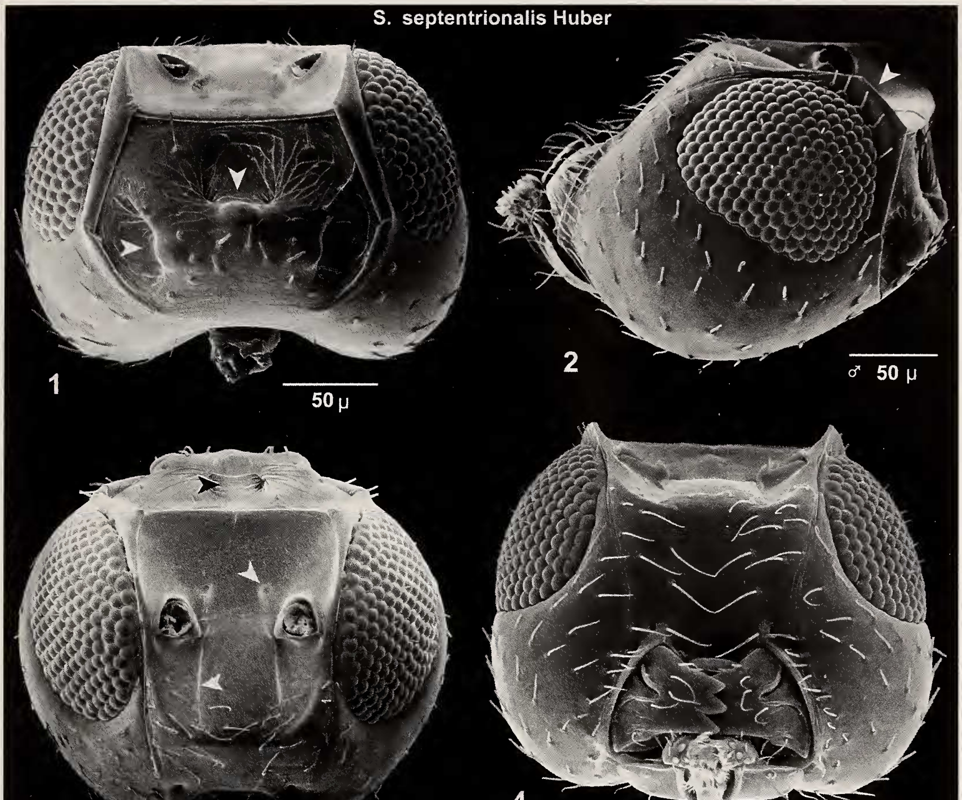
Australian and Pacific: Australia, Fiji (Viti Levu I.), Hawai'i (Kauai I., Kure Atoll, Molokai I., Pearl & Hermes Atoll, Laysan I., Oahu I.), Midway I., Northern Mariana Is. (Saipan) (CISC), Society Islands (Tahiti, Moorea, Bora Bora).

A collection of about 600 specimens of *Polynema* received for identification from a gypsy moth survey using Malaise traps in Minnesota included six *Stephanodes*. On the basis of this single sample *Stephanodes* appears to be about 1% as abundant as *Polynema*. Because of similarity in colour and habitus, collections of *Polynema* should be examined carefully for the occasional *Stephanodes* that is likely to be included with them.

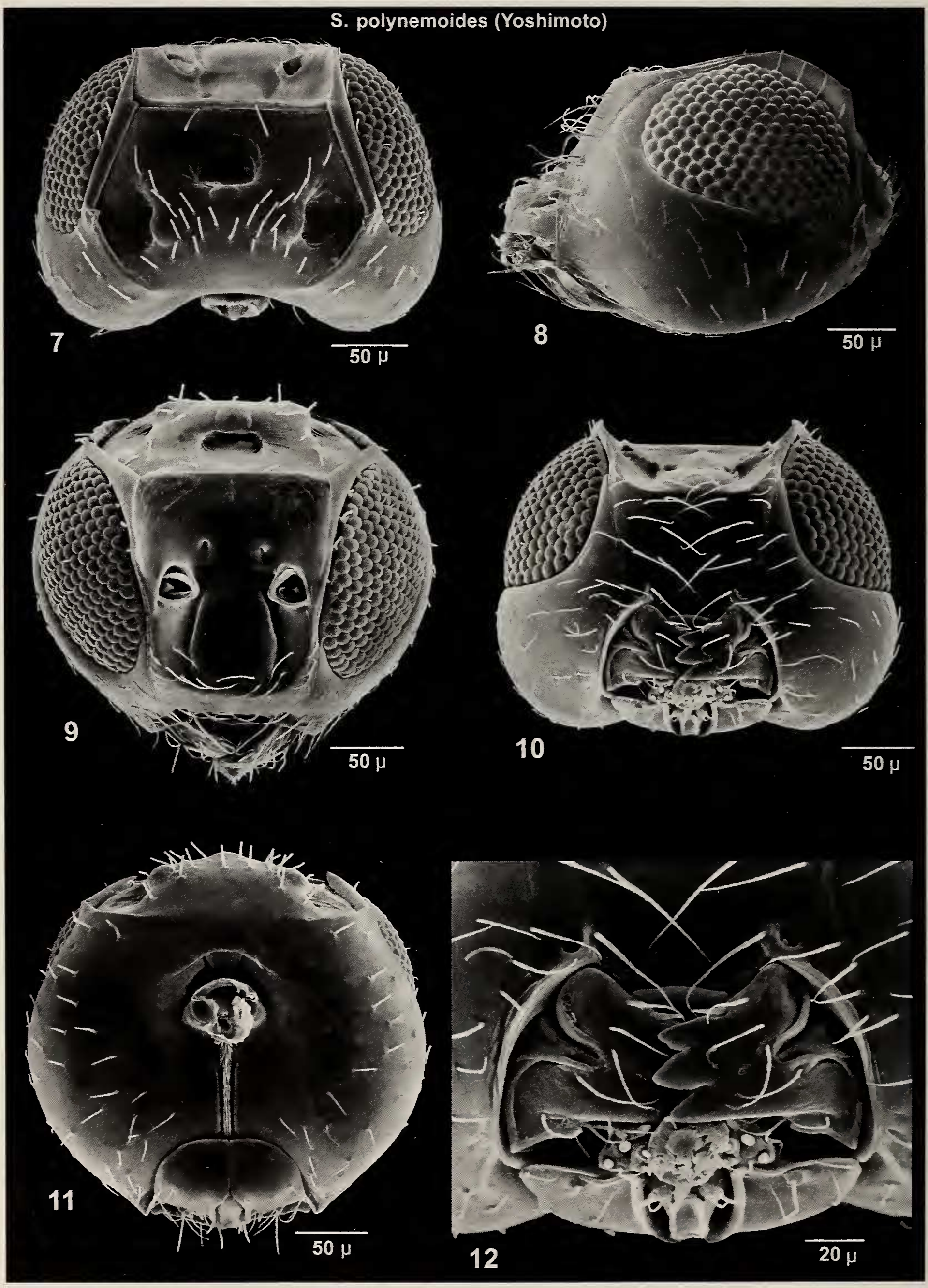
Discussion

Two lines of evidence suggest that the genus *Stephanodes* originated in the New World, likely in South America. First, the presumed sister group *Agalmopolynema* is only known from southern South America. Second, the greatest morphological diversity and perhaps also number of *Stephanodes* species (five) occurs in the New World, though we consider two of these, *S. reduvioli* and *S. similis*, as introductions from the Old World. The next most diverse region is perhaps Africa, with at least 3 species of which only one, *S. chestertoni*, is described. The rest of the world has two widespread species that are extremely similar morphologically, though perhaps several others, similar to *S. similis* or *S. reduvioli*, exist.

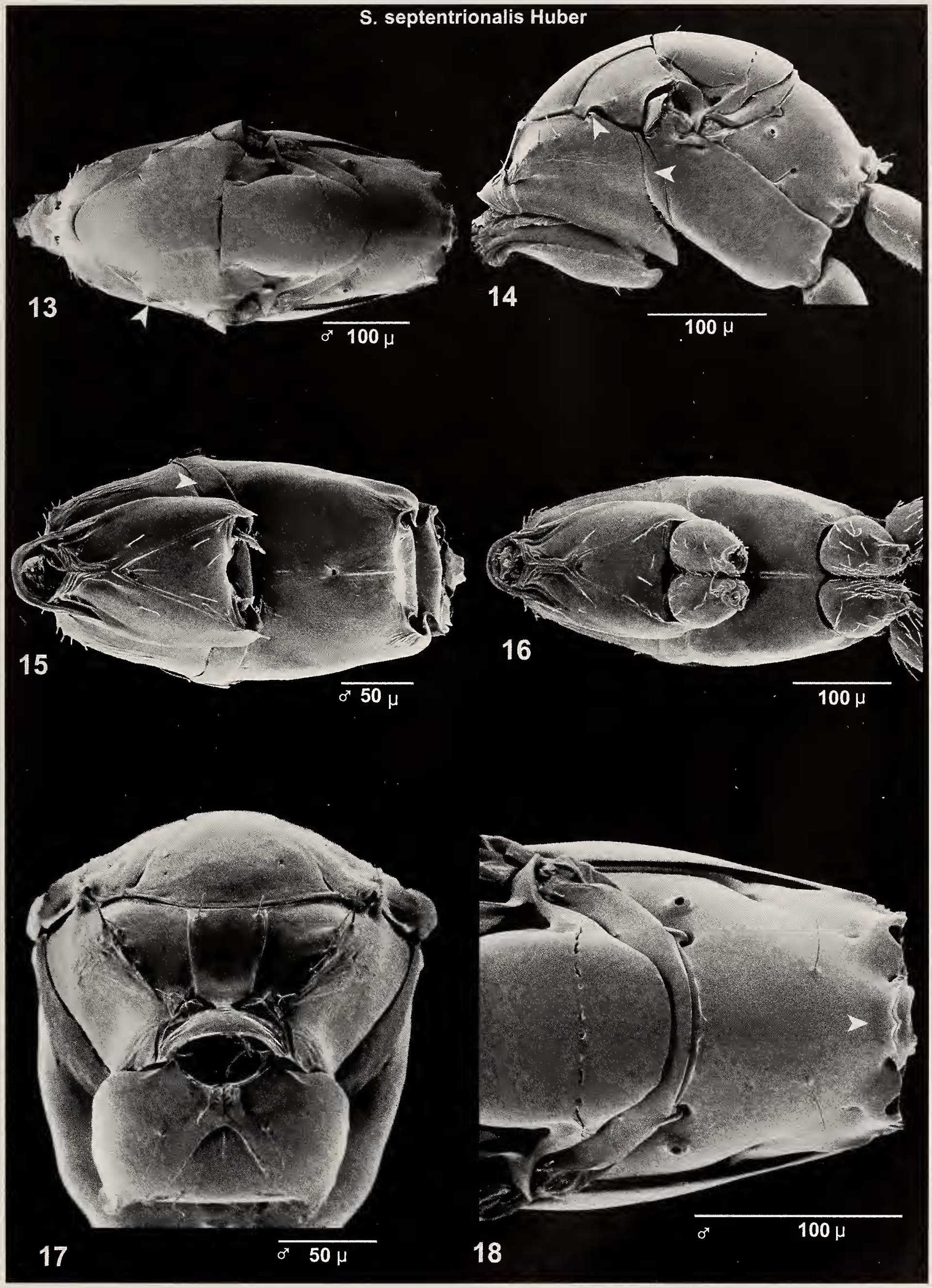
Within the *S. similis/reduvioli* nominal species, two extremes of speciation can be envisaged. First, populations of *Stephanodes* in each reasonably cohesive region, *e.g.*, Europe, Indian subcontinent, southeast Asia, Africa south of the Sahara, Japan, Australia, and the various Pacific Islands, could each represent a different species, perhaps differentiated by minute morphological differences as well as biological differences. Second, there really may be only one or two very widely distributed species with only minor morphological differences among the different regional populations. We have been fairly conservative and have chosen the second alternative, maintaining only two species on the basis of presence or absence of a sickle-shaped sensillum on F3. More biological information, particularly cross-breeding work, may eventually demonstrate that *S. similis* and *S. reduvioli* actually represent only one species.



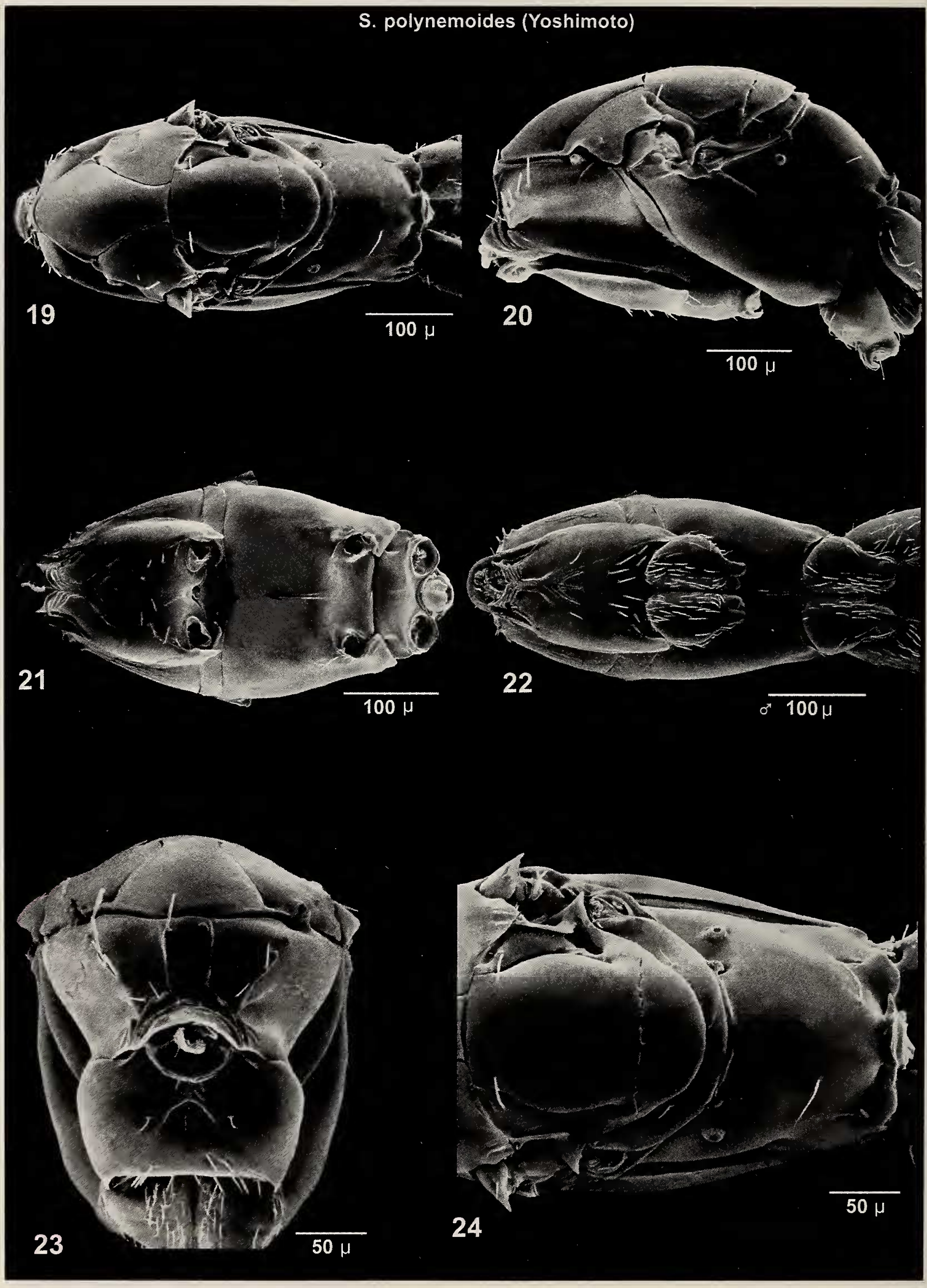
FIGURES 1-6. *Stephanodes septentrionalis* Huber. 1-5, head - dorsal, lateral, anterior, ventral, and posterior views, respectively; 6, mouthparts. Arrows indicate diagnostic features of genus.



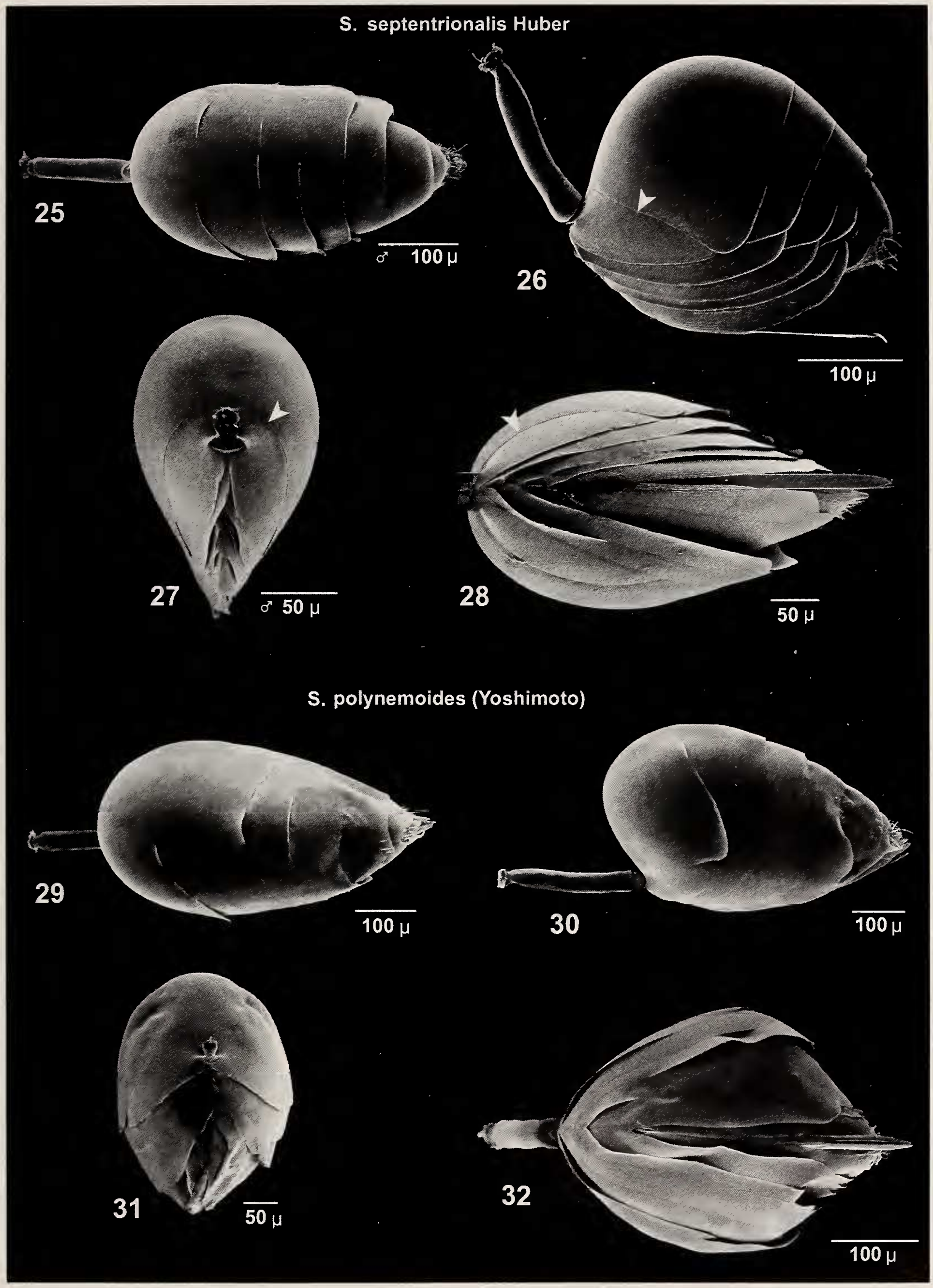
FIGURES 7-12. *Stephanodes polynemoides* (Yoshimoto). 7-11, head - dorsal, lateral, anterior, ventral, and posterior views, respectively; 12, mouthparts.



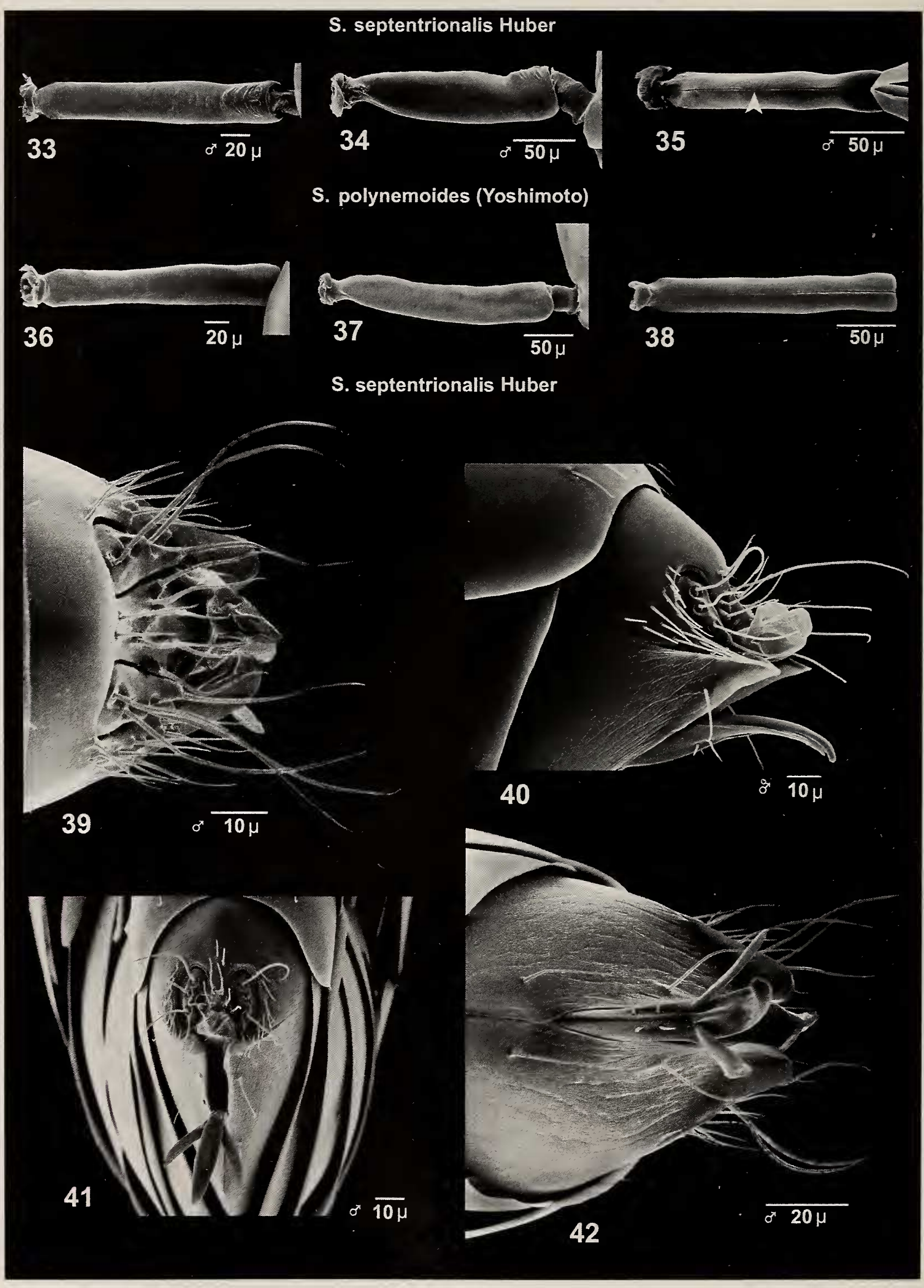
FIGURES 13-18. *Stephanodes septentrionalis*. 13-17, mesosoma - dorsal, lateral, ventral (without and with coxae), and anterior views, respectively; 18, mesoscutum - propodeum. Arrows indicate diagnostic features of genus.



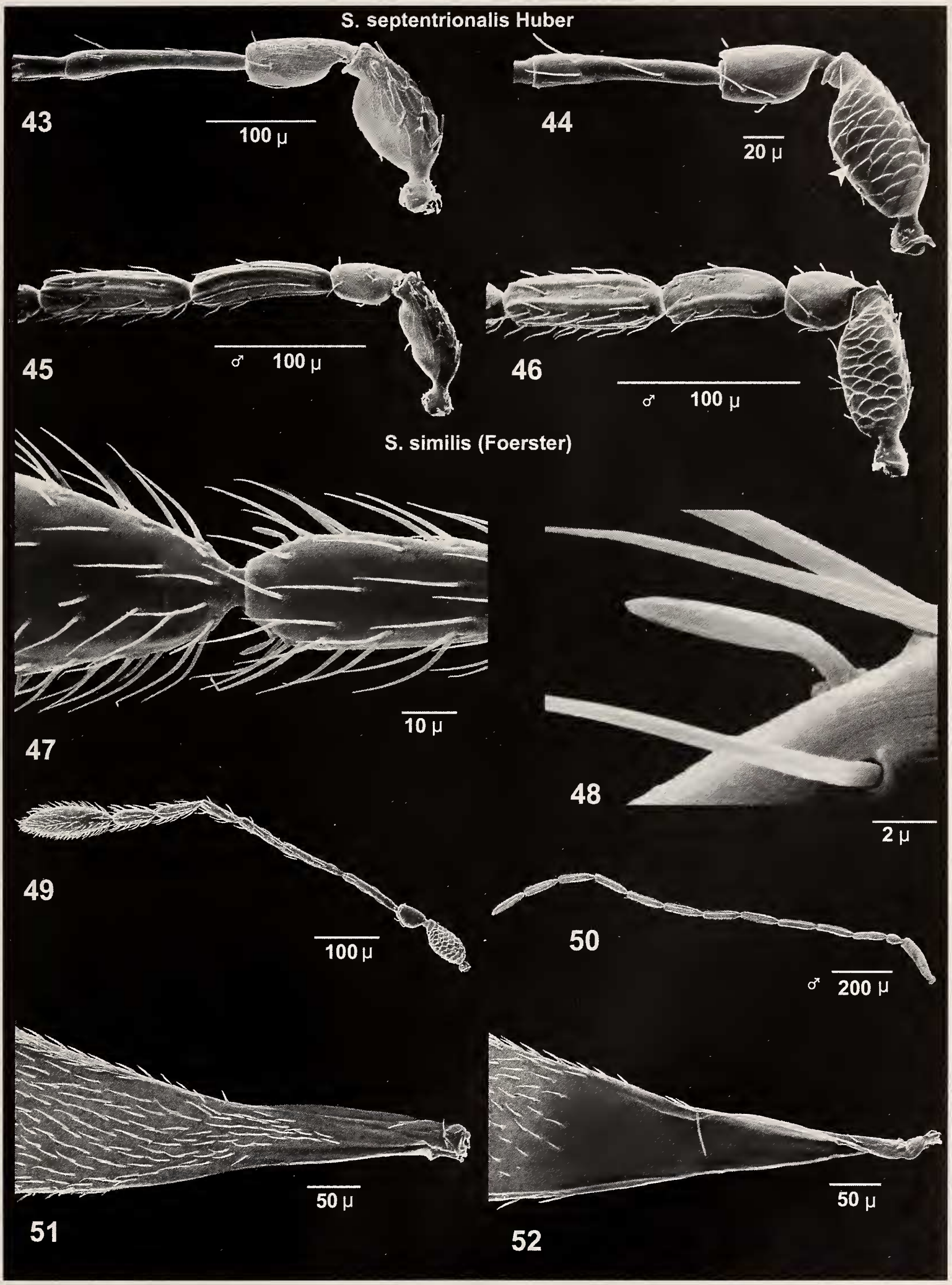
FIGURES 19-24. *Stephanodes polynemoides*. 19-23, mesosoma - dorsal, lateral, ventral (without and with coxae), and anterior views, respectively. 24, mesoscutum - propodeum.



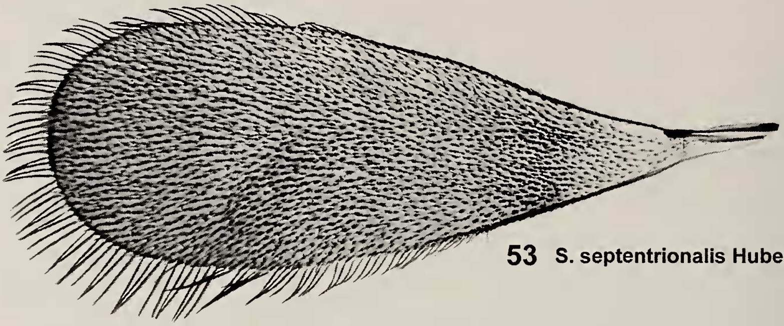
FIGURES 25-32. Metasoma - dorsal, lateral, anterior, and ventral views, respectively. 25-28, *Stephanodes septentrionalis*; 29-32, *S. polynemoides*.



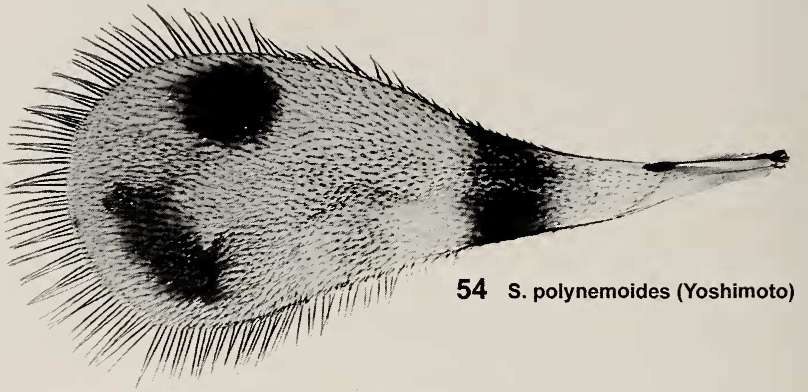
FIGURES 33-42. 33-38, gastral petiole, dorsal, lateral, ventral views, respectively. 33-35, *Stephanodes septentrionalis*; 36-38, *S. polynemoides*. 39-42. *S. septentrionalis*, apex of gaster (and partially protruded male genitalia), dorsal, lateral, posterior, and ventral views, respectively.



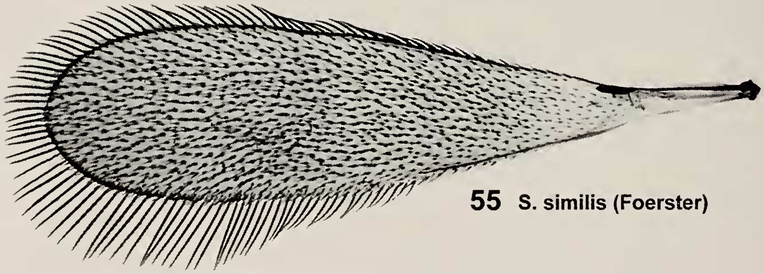
FIGURES 43-52. 43-46, *Stephanodes septentrionalis*, outer and inner aspect of female and male antenna (scape - F1 or, for males, F2), respectively. 47-52, *S. similis* Förster; 47, F6 and base of clava; 48, enlarged sickle-shaped sensillum on funicle segment; 49, female antenna; 50, male antenna; 51, base of forewing, dorsal view; 52, base of forewing, ventral view.



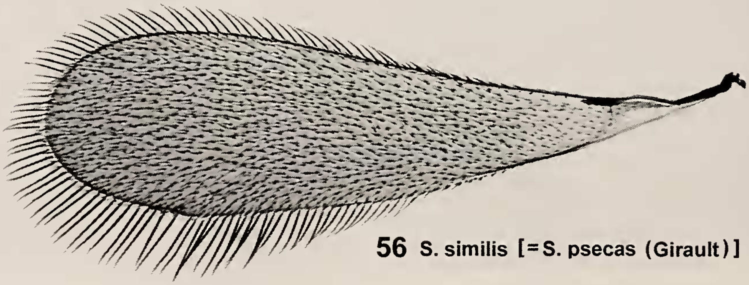
53 S. septentrionalis Huber



54 S. polynemoides (Yoshimoto)

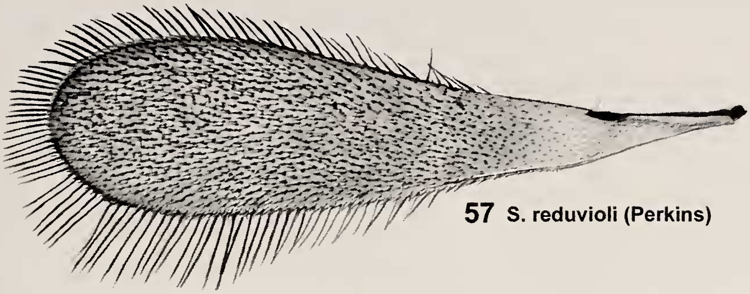


55 S. similis (Foerster)

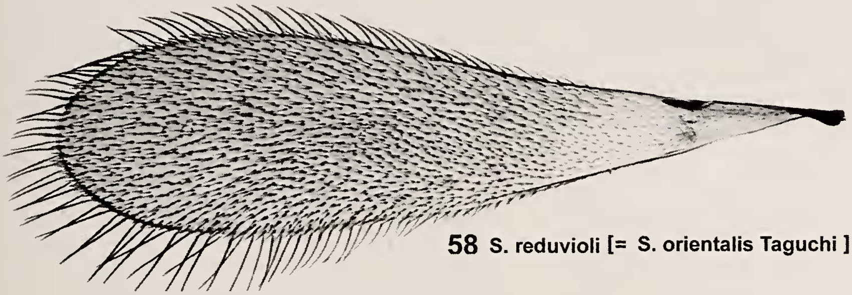


56 S. similis [=S. psecas (Girault)]

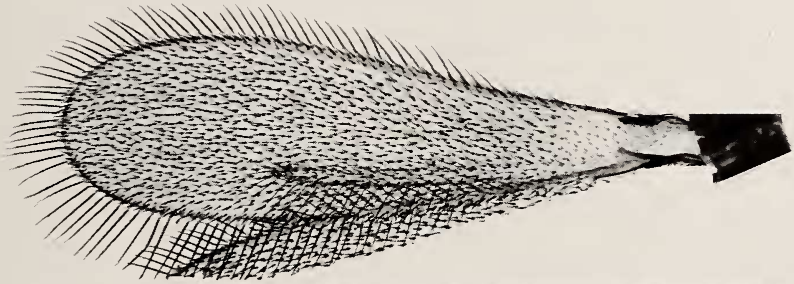
FIGURES 53-56. *Stephanodes* forewings. 53, *septentrionalis*, holotype; 54, *polynemoides*, paratype; 55, *similis* from Vranov, Czech Republic; 56, similis [=*psecas*] from Rock Co., WI, USA.



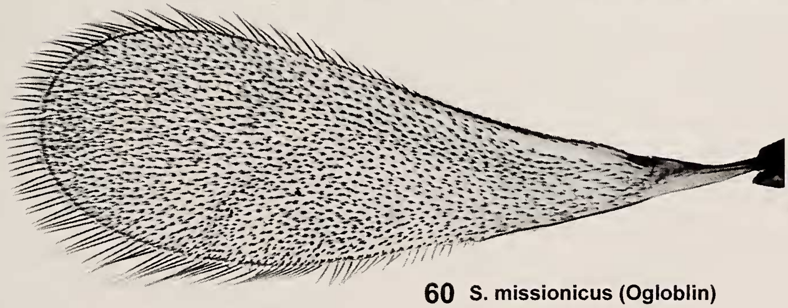
57 S. reduvioli (Perkins)



58 S. reduvioli [= S. orientalis Taguchi]

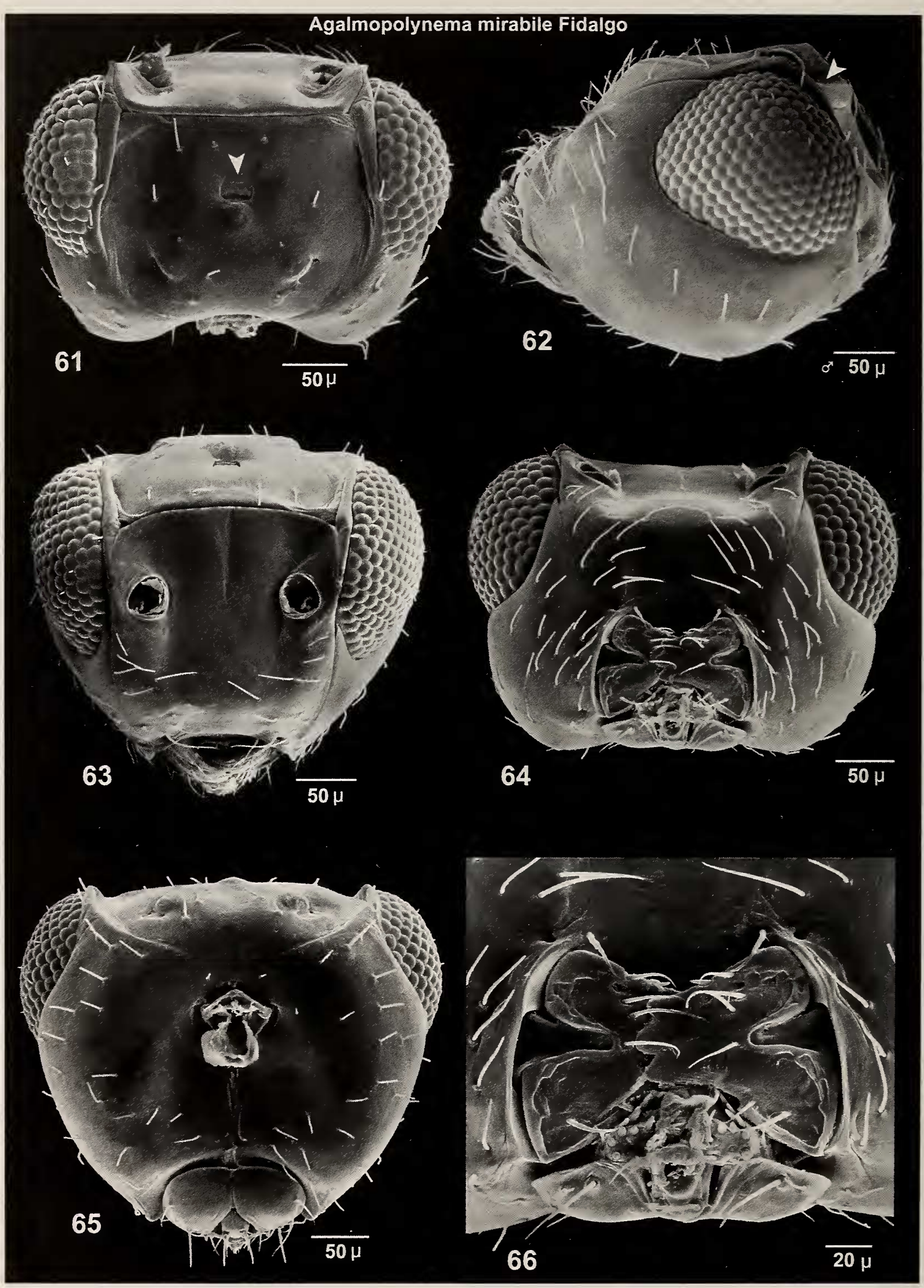


59 S. reduvioli [= S. imbricatus (Narayanan & Subba Rao)]

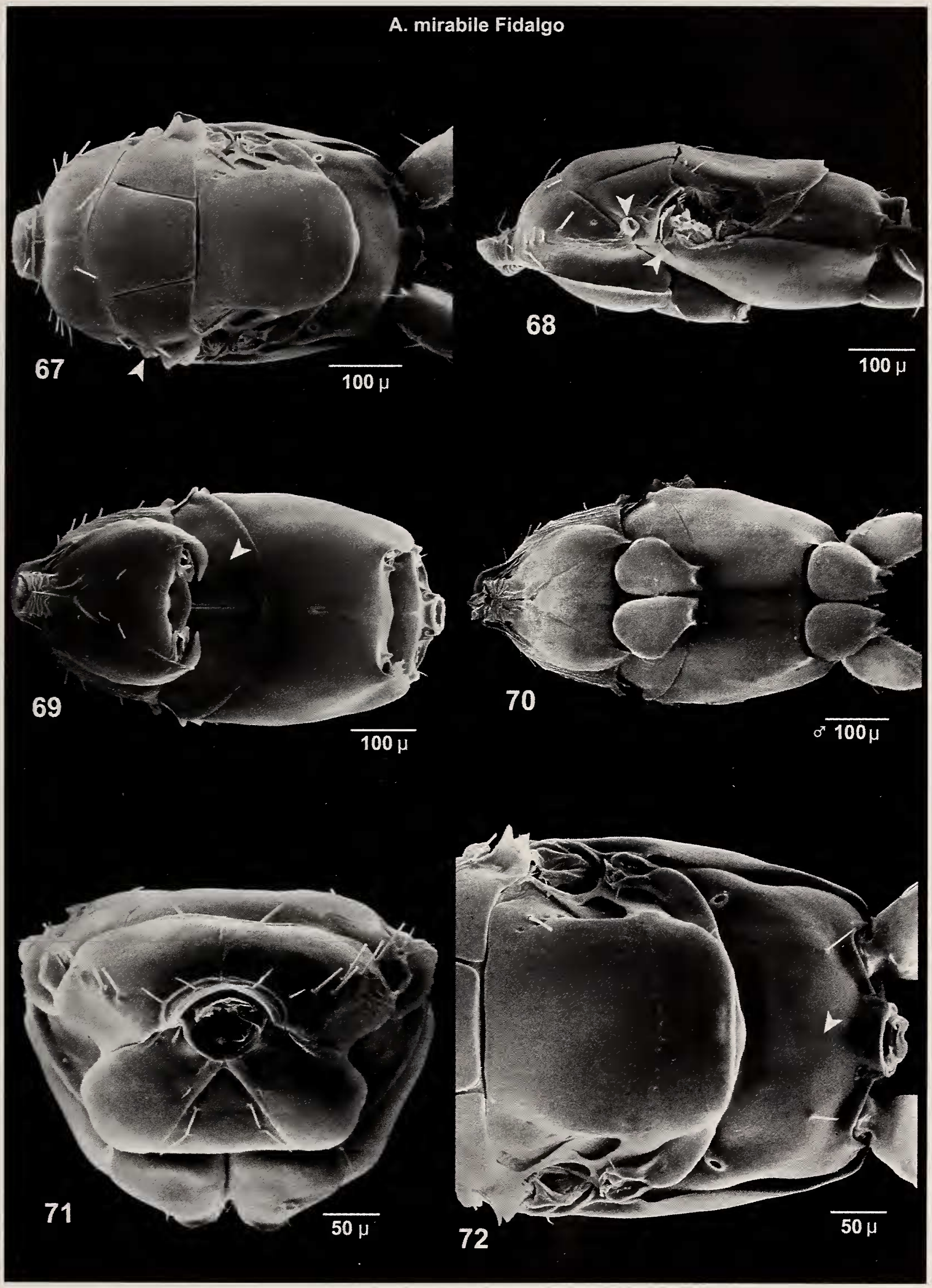


60 S. missionicus (Ogloblin)

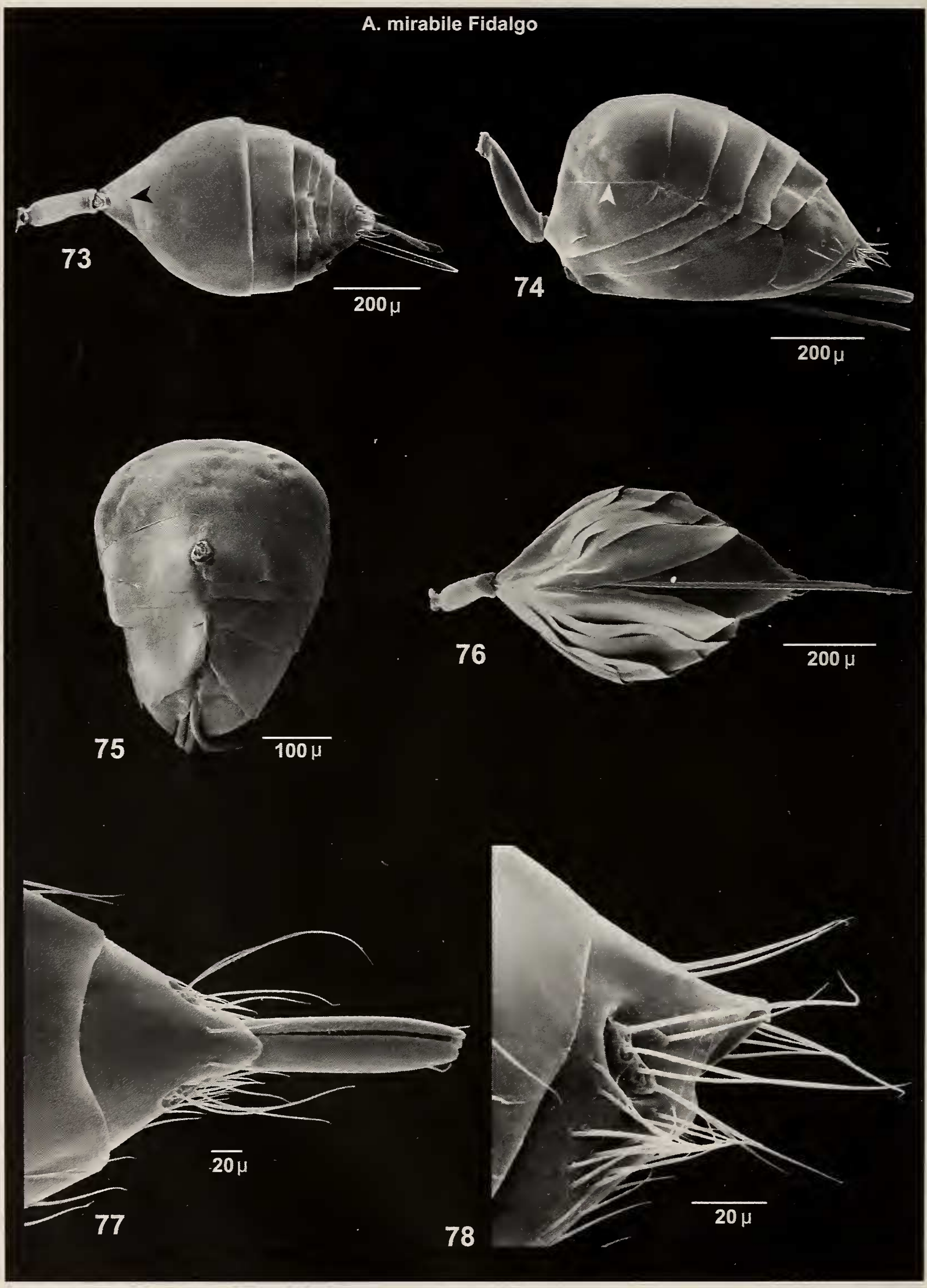
FIGURES 57-60. *Stephanodes* forewings. 57, *reduvioli* from Kokee, Kauai; 58, *reduvioli* [= *orientalis*] from Tsukuba, Japan; 59, *reduvioli* [= *imbricatus*] from New Dehli, India; 60, *missionicus*, paratype.



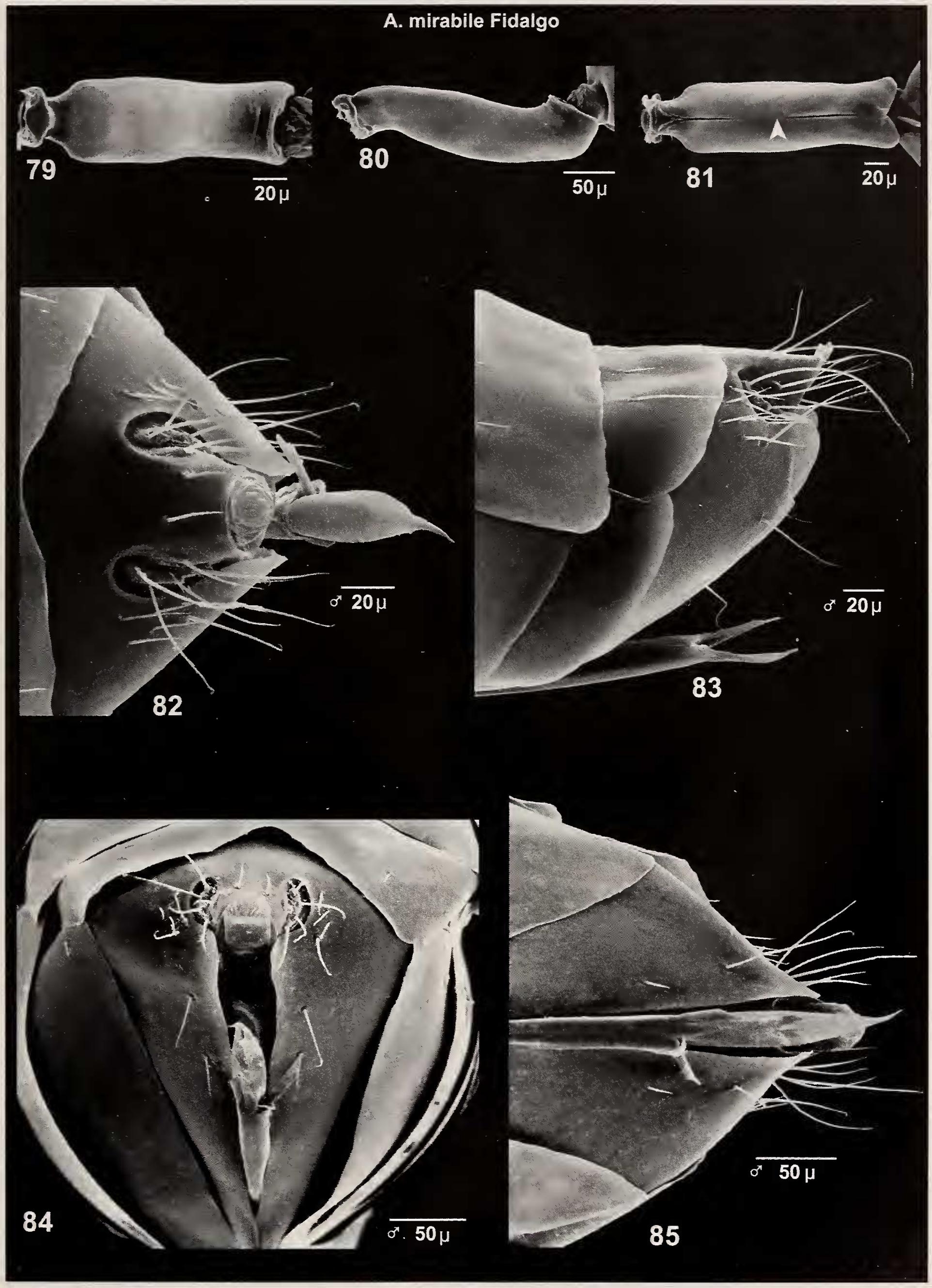
FIGURES 61-66. *Agalmopolynema mirabile* Fidalgo. 61-65, head - dorsal, lateral, anterior, ventral, and posterior views, respectively; 66, mouthparts. Arrows indicate diagnostic features of genus.



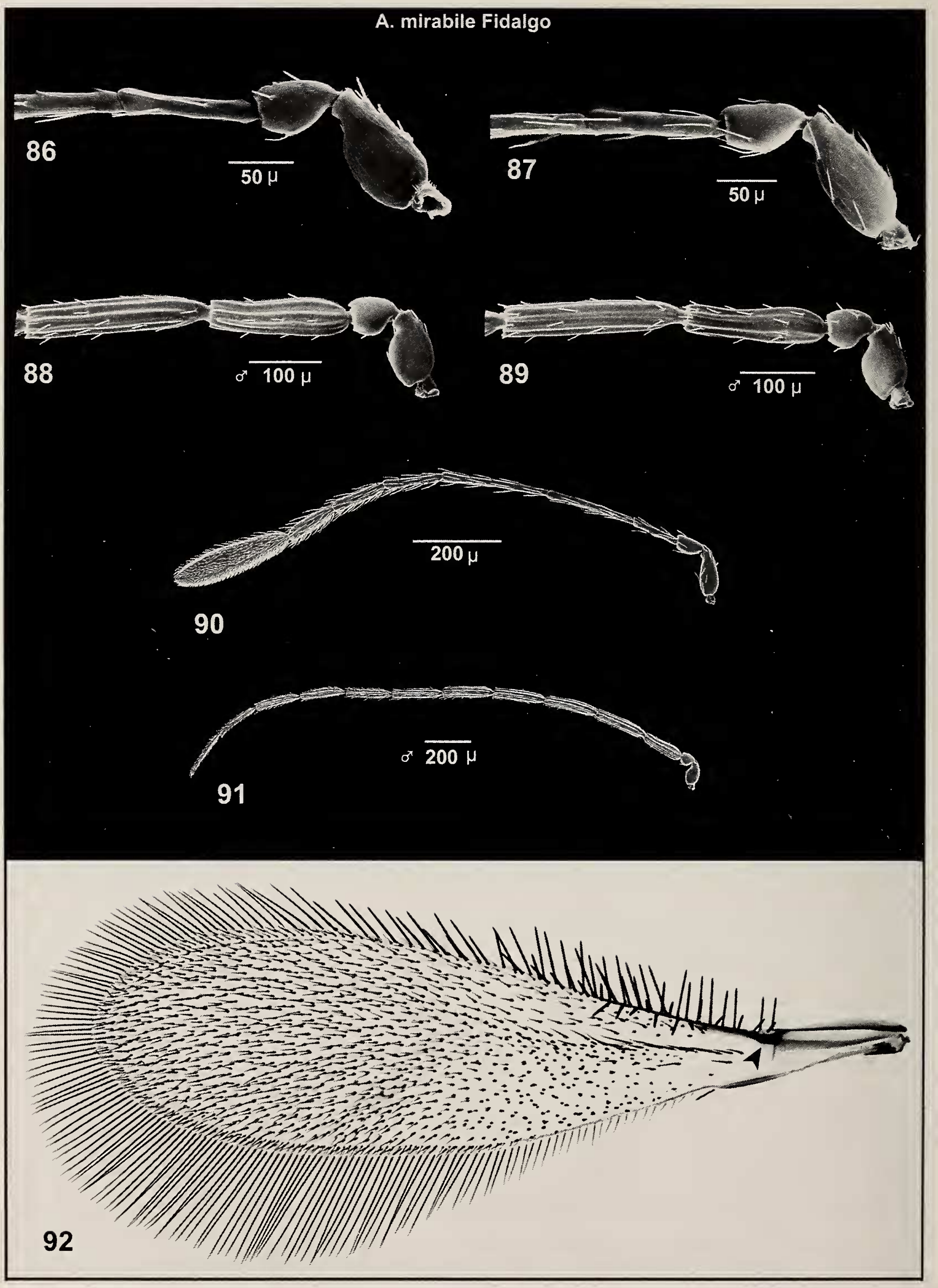
FIGURES 67-72. *Agalmopolynema mirabile*. 67-71, mesosoma - dorsal, lateral, ventral (without and with coxae), and anterior views, respectively; 72, mesoscutum - propodeum. Arrows indicate diagnostic features of genus.



FIGURES 73-78. *Agalmopolynema mirabile*. 73-76, metasoma - dorsal, lateral, anterior, and ventral views, respectively; 77 and 78, apex of gaster, dorsal and lateral views, respectively.



FIGURES 79-85. *Agalmopolynema mirabile*. 79-81, gastral petiole, dorsal, lateral, and ventral views, respectively; 82-85, apex of gaster (and partially protruded male genitalia), dorsal, lateral, posterior, and ventral views, respectively.



FIGURES 86-92. *Agalmopolynema mirabile.* 86-89, outer and inner aspect of female and male antenna (scape - F1 or, for males, F2), respectively; 90, female antenna; 91, male antenna; 92, forewing.

Acknowledgements

Curators of the various museums listed above are thanked for loan of material, particularly the types. Mr. K. Bolte, Canadian Forest Service, Ottawa, prepared the SEM and wing illustrations and assembled the final, digitized computer plates. Drs. G. Gibson and H. Goulet, ECORC, Agriculture Canada, Ottawa, reviewed the final ms and provided valuable suggestions for its improvement.

Literature Cited

Annecke, D.P. 1961. The genus *Mymar* Curtis (Hymenoptera, Mymaridae). South African Journal of Agricultural Science, 4: 543-552.

Annecke, D.P. and R.L. Doutt. 1961. The genera of the Mymaridae. Hymenoptera: Chalcidoidea. Entomology Memoirs. Department of Agricultural Technical Services. Republic of South Africa, 5: 1-71.

Bakkendorf, O. 1934. Biological investigations on some Danish hymenopterous egg-parasites, especially in homopterous and heteropterous eggs, with taxonomic remarks and descriptions of new species. Entomologiske Meddelelser, 19: 1-135.

Beardsley, J.W. and J.T. Huber. 1998. Key to genera of Mymaridae from the Hawaiian Islands, with notes on some of the species (Hymenoptera: Mymaridae). Proceedings of the Hawaiian Entomological Society (in press).

Bin, F., S. Colazza, N. Isidoro, M. Solinas, and B. Vinson. 1989. Antennal chemosensilla and glands, and their possible meaning in the reproductive behavior of *Trissolcus basalis* (Woll.) (Hym.: Scelionidae). Entomologica, 24: 33-97.

Bin, F. and P. Dessart. 1983. Cephalic pits in Proctotrupoidea Scelionidae and Ceraphronoidea (Hymenoptera). Redia, 66: 563-575.

Bolte, K.B. 1996. Techniques for obtaining scanning electron micrographs of minute arthropods. Proceedings of the Entomological Society of Ontario, 127: 67-87.

Bouček, Z. 1977. A faunistic review of the Yugoslavian Chalcidoidea (parasitic Hymenoptera). Acta Entomologica Jugoslavica 13, Supplement. 145 pp.

Debauche, H.R. 1948. Etude sur les Mymarommidae et les Mymaridae de la Belgique (Hymenoptera Chalcidoidea). Mémoires du Musée Royal d'Histoire Naturelle de Belgique, 108: 1-248.

Debauche, H.R. 1949. Mymaridae (Hymenoptera Chalcidoidea). Exploration du Parc National Albert, Mission G.F. de Witte (1933-35), 49: 1-105.

Doutt, R.L. 1955. Insects of Micronesia. Hymenoptera: Trichogrammatidae and Mymaridae. Insects of Micronesia, 19(1): 1-17.

Enock, F. 1909. New genera of British Mymaridae (Haliday). Transactions of the Royal Entomological Society of London, 4: 449-459.

Fidalgo, A.P. 1988. Sobre *Agalmopolynema* Ogl. nov. status, género peculiar de los bosques australes argentinos de *Nothofagus* (Hymenoptera: Mymaridae). Anales del Museo de Historia Natural de Valparaiso, 19: 43-64.

Fitton, M.G., M.W.R. de V. Graham, Z.R.J. Bouček, N.D.M. Fergusson, T. Huddleston, J. Quinlan and O.W. Richards. 1978. A check list of British Insects. Second Edition (Completely revised). Part 4: Hymenoptera. Handbooks for the Identification of British Insects Vol. 11, Pt. 4. 159 pp.

Förster, A. 1847. Ueber die Familie der Mymariden. Linnaea Entomologica, 2: 195-233.

Girault, A.A. 1911. Descriptions of North American Mymaridae with synonymic and other notes on described genera and species. Transactions of the American Entomological Society, 37: 253-324.

Girault, A.A. 1912a. On the occurrence of a European species of Mymaridae in North America. Canadian Entomologist, 44: 88-89.

Girault, A.A. 1912b. The occurrence of the mymarid genus *Stephanodes* Enock in North America. Journal of the New York Entomological Society, 20: 40-44.

Girault, A.A. 1913. Critical notes on some species of Mymaridae from the Sandwich (Hawaiian) Islands, with comparative notes on Australian, North American, and European forms. (Hymenoptera; Chalcidoidea). Proceedings of the Entomological Society of Washington, 15: 9-20.

Graham, M.W.R. de V. 1982. The Haliday collection of Mymaridae (Insecta, Hymenoptera, Chalcidoidea) with taxonomic notes on some material in other collections. Proceedings of the Royal Irish Academy, B - Biological, Geological and Chemical Science, 82: 189-243.

Hayat, M. 1992. Records of some Mymaridae from India, with notes (Hymenoptera: Chalcidoidea). Hexapoda, 4(1): 83-89.

Hincks, W.D. 1950. Notes on some British Mymaridae (Hym.). Transactions of the Society for British Entomology, 10(4):167-207.

Horn, W. and I. Kahle. 1935. Über entomologische Sammlungen. (Ein Beitrag zur Geshichte der Entomo-Museologie). Teil I. Entomologische Beihefte, Berlin-Dahlem. 160 pp. + 16 plates.

Huber, J.T. 1986. Systematics, biology, and hosts of the Mymaridae and Mymarommatidae (Insecta: Hymenoptera): 1758-1984. Entomography, 4: 185-243.

Huber, J.T. and S.V. Rajakulendran. 1988. Redescription of and host-induced antennal variation in *Anaphes iole* Girault (Hymenoptera: Mymaridae), an egg parasite of Miridae (Hemiptera) in North America. Canadian Entomologist, 120: 893-901.

Kerzhner, I.M. 1981. Bugs of the family Nabidae. Fauna SSSR (new series no. 124). Nasekomye Khobotnye, 13(2): 1-324 [in Russian].

Kryger, J.P. 1950. The European Mymaridae comprising the genera known up to c. 1930. Entomologiske Meddelelser, 26: 1-97.

Mani, M.S. and G.G. Saraswat. 1973. Family Gonatoceridae. Pp. 78-125 *In* M.S. Mani, O.P. Dubey, B.K. Kaul, and G.G. Saraswat (eds) On some Chalcidoidea from India. Memoirs of the School of Entomology, St. John's College, Agra 2. 128 pp.

Mathot, G. 1968. Mymaridae nouveau d'Afrique central (Hymenoptera: Chalcidoidea). Revue de Zoologie et de Botanique Africaines, 78: 265-276.

Motteler, L.S. 1986. Pacific Island Names. A map and name guide to the new Pacific. Bishop Museum Miscellaneous Publication 34. 91 pp.

Narayanan, E.S. and B.R. Subba Rao. 1961. Studies on Indian Mymaridae III. Beiträge der Entomologie, 11: 655-670.

Noyes, J.S. and E.W. Valentine. 1989. Mymaridae (Insecta: Hymenoptera) - introduction, and review of genera. Fauna of New Zealand no. 17. 95 pp.

Ogloblin, A.A. 1946. Descriptions of new genera and species of Mymaridae (Hymenoptera: Chalcidoidea). Iowa State College Journal of Science, 20: 277-295.

Ogloblin, A.A. 1952. Los insectos de las islas Juan Fernandez 12. Mymaridae (Hymenoptera). Revista Chilena de Entomología, 2: 119-138.

Ogloblin, A.A. 1960a. Los representantes nuevos de la tribu Polynematini de la República Argentina (Hymenoptera, Mymaridae). Neotropica, 6(19): 1-11.

Ogloblin, A.A. 1960b. Las especies nuevas del gen. *Barypolynema* A. Ogl. (Hymenoptera, Mymaridae). Neotropica, 6(21): 71-80.

Ogloblin, A.A. 1967. Mimáridos nuevos de Argentina (Hymenopt. Mymaridae). Acta Zoologica Lilloana, 22: 183-196.

Perkins, R.C.L. 1905. Leaf-hoppers and their natural enemies (Pt. VI. Mymaridae, Platygasteridae). Bulletin of the Hawaiian Sugar Planters' Association Experiment Station., Division of Entomology, 1: 187-205.

Schauff, M.E. 1984. The holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). Memoirs of the Entomological Society of Washington 12. 67 pp.

Soyka, W. 1946. Revision einiger Mymridengattungen. Zentralblatt für das Gesamtgebiet der Entomologie, 1(2): 33-44.

Soyka, W. 1956. Monographie der Polynemagruppe. Abhandlungen der Zoologisch-botanischen Gesellschaft in Wien, 19: 1-115.

Subba Rao, B.R. and M. Hayat. 1983. Key to the genera of Oriental Mymaridae, with a preliminary catalog (Hymenoptera: Chalcidoidea). Pp. 125-150 *In* V.K. Gupta (ed) Studies on the Hymenoptera. A collection of articles on Hymenoptera commemorating the 70th birthday of Henry K. Townes. Contributions of the American Entomological Institute, 20: 1-471.

Swezey, O.H. 1936. Biological control of the sugar cane leafhopper in Hawaii. The Hawaiian Planters' Record, 40: 57-101.

Taguchi, H. 1978. A new species of the genus *Stephanodes* from Japan and Taiwan (Hymenoptera: Mymaridae). Transactions of the Shikoku Entomological Society, 14: 73-76.

Timberlake, P.H. 1924. Records of introduced and immigrant chalcid flies of the Hawaiian Islands (Hymenoptera). Proceedings of the Hawaiian Entomological Society, 5: 418-449.

Thompson, W.R. 1958. Mymarid. Pp. 565-572 *In* A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 5. Hosts of the Hymenoptera (Miscogasteridae to Trigonalidae), Lepidoptera and Strepsiptera. Commonwealth Institute of Biological Control, Ottawa. Pp. 562-698.

Viggiani, G. 1973. Ricerche sugli Hymenoptera Chalcidoidea XXXIX. Notizie preliminari sulla struttura e sul significato dell'armatura genitale esterna maschile dei Mimaridi. Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" Portici, 30: 269-281.

Webb, D.W. 1980. Primary insect types in the Illinois Natural History Survey collection, exclusive of the Collembola and Thysanoptera. Illinois Natural History Survey Bulletin, 32: 55-191.

Yoshimoto, C.M. 1990. A review of the genera of New World Mymaridae (Hymenoptera: Chalcidoidea). Flora & Fauna Handbook no. 7. Sandhill Crane Press, Gainesville. 166 pp.

(Received 3 October 1997; accepted 1 December 1997)